

Augmenting Treatment Intensification with Polytherapy Beyond Infliximab in Kawasaki Disease with Medium and Giant Coronary Artery Aneurysms at Diagnosis: Experience from a Tertiary Care Center in Eastern India

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Introduction

Kawasaki Disease (KD), an acute systemic vasculitis of childhood, is emerging as a leading cause of acquired heart disease in children. Coronary artery aneurysms (CAA) are the major determinant of outcome. Medium and Giant CAA carry high risk of thrombosis, stenosis and persistence. Infliximab (IFX) is used for IVIG-resistant or high-risk KD, but IFX alone may be insufficient for satisfactory regression of medium and giant CAAs. Accentuating treatment intensification with additional immunomodulation early may improve coronary outcomes.

Aims

1. To compare coronary outcomes in medium CAA (Z 5 to < 10) patients treated with infliximab alone versus infliximab plus other immunomodulators.
2. To evaluate coronary outcomes at 3 and 6 months in giant CAA (Z ≥10) patients treated with intensified polytherapy

Methods

Retrospective analysis of 29 KD patients with coronary artery Z score ≥ 5 within 4 weeks of disease onset, between January 2020 to February 2026, who received additional immunosuppressants for therapy intensification. Serial follow up echocardiographic findings were recorded on excel sheet and analyzed. Coronary Z-scores were calculated

using Dallaire et al. system. Medium CAA cohort divided into IFX only and IFX+OTHERS (IFX plus IV methylprednisolone/prednisolone, cyclosporine, or anakinra). Baseline maximum Z, Z at 2 weeks, 6 weeks, 3 months and 6 months, delta Z and regression to Z<2 were compared. Giant cohort outcomes were downgraded to Z<10 and Z<5 at 3 months and 6 months. Mann-Whitney U and Fisher exact tests used.

Results

A total of 29 patients were included with medium (n=18) and giant (n=11) CAA at diagnosis of KD. Among 18 medium CAA patients, 4 received IFX alone (IFX only) and 14 received IFX combined with other immunomodulators (IFX+OTHERS). Despite higher baseline Z, IFX+OTHERS achieved greater Delta Z reduction at 6 months (6.0 vs 2.7. p=0.063) and higher regression to Z<2 (85.7% vs 50%).

Comparison of coronary artery outcome in medium CAA between two groups:

Parameter	IFX only (n=4)	IFX+OTHERS (n=14)	p-value
Baseline max Z (median)	6.55	7.7	0.07
Delta Z 3mo (median)	2.4	5.4	0.136
Delta Z 6mo (median)	2.7	6.0	0.063 trend
Z <2 at 3mo	50% (2/4)	71% (10/14)	0.57
Z <2 at 6mo	50% (2/4)	85.7% (12/14)	0.19

All giant CAA patients (n=11) received IFX along with other immunomodulators. Among them, 4/11 received IFX + steroid + cyclosporin, 6/11 IFX + cyclosporin, and 1/11 received IFX + cyclosporin + anakinra.

Outcome of giant aneurysms were as follows:

Timepoint	N	Giant (>=10)	Medium (5-10)	Small (2.5-5)	Normal (<2.5)	Downgrade
3 months	11	3 (27.3%)	6 (54.5%)	0 (0%)	2 (18.2%)	8/11 (72.72%)
6 months	11	1 (9.09%)	2 (18.18%)	4 (36.36%)	4 (36.36%)	10/11 (90.9%)

Among giant CAA patients, 3/11(27.2%) developed coronary thrombosis within 2 weeks of onset of symptoms. Thrombus resolved in 2 patients by one month and in 1 patient by two months on anticoagulation.

Conclusion:

Medium CAA showed higher regression rates with IFX-based combination therapy than IFX alone. Our 85.7% normalization of medium CAA at 6 months in IFX+OTHERS group is comparable to 83% early regression within 2 months reported with IFX-only intensification by Miyata et al, and higher than the 2-year cumulative regression of 67% for medium-large CAA reported by Nagatomo et al with IFX-only therapy. This suggests that IFX+OTHERS work better than IFX alone for medium CAA regression.

Giant CAA patients receiving intensified polytherapy with IFX-combinations demonstrated substantial early downgrade ($Z < 10$ in 72.72% at 3 months) and sustained regression ($Z < 10$ in 90.9% at 6 months).

Thus, intensification polytherapy beyond IFX yields favorable outcomes in KD presenting with medium and giant CAA at diagnosis.

Clinical Profile and Outcome of 150 patients with Kawasaki Disease from a Tertiary Care Center: A Retrospective Cross-Sectional Study

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Background: Kawasaki disease (KD) is a medium vessel vasculitis of childhood with a predilection for coronary arteries, presenting acutely with fever and a typical constellation of clinical findings. This study was conducted to evaluate the clinical and echocardiographic characteristics, treatment received, and outcome of patients diagnosed with Kawasaki disease (KD) during follow up at a tertiary care center in South India.

Methods: Diagnosis of KD was made as per standard AHA criteria. Data of all patients diagnosed with KD between Feb 2017, and June 2026 were collected from inpatient files and outpatient follow-up clinical records.

Results: A total of 150 patients were diagnosed with KD during the study period. The mean age at presentation was 42 months, with 33 patients (22%) presenting during infancy. The most common presenting features were fever, oral mucositis, rash, conjunctival injection and extremity changes, followed by cervical lymphadenopathy (Table-1). The mean duration of fever was 9.3 days, with delayed diagnosis (>10 days) in 45 patients (31.69%). Atypical manifestations such as arthritis were noted in three patients, epididymo-orchitis in one, pneumonia in one, nephrotic Syndrome (congenital NS? Finnish type) in one and hepato-biliary involvement in another. KD shock syndrome was noted in 4.67 % (n=7).

Intravenous immunoglobulin (IVIG at 2gm/kg) was administered in all patients and when indicated, IV infliximab (10 mg/kg) and IV Methyl prednisolone (2 mg/kg) were given either as part of primary intensification or as second line therapy. Steroids were tapered over 2-3 weeks. Overall, 28.67 % (n=43) were IVIG-refractory and required additional second line therapy. Six children required cyclosporine as they were refractory to above mentioned therapy. Anakinra was used in three cases {indication – refractory disease, n=2; and KD shock syndrome, n=1}. Low dose Aspirin was given to all patients, while those with moderate coronary artery aneurysms (CAA) received additional clopidogrel. Patients with giant CAAs were treated with LMWH

heparin or direct oral anticoagulants (Apixaban) based on tolerance and compliance. Echocardiography revealed abnormalities in 45.3% (n=68) of the patients, with coronary artery aneurysms being the most common finding. Among the coronary arteries, aneurysms were most frequently associated with the LMCA, followed by the LAD, RCA and LCX in our study. Among the 68 patients with abnormal coronary artery findings, follow-up echocardiography at 6 weeks showed normalization of coronary arteries in 46 patients, while 22 (14.67%) patients continued to have CAAs. At the most recent follow-up, resolution of CAAs was observed in 6 patients within 6 months to 1 year, in another 4 patients between 1.5 and 2 years, and in 2 patients between 4 and 6 years. Eight patients continued to have persistent CAAs, and two were lost to follow-up. A 4-month-old male diagnosed with KD in Sept 2022, had bilateral axillary artery aneurysms at presentation along with multiple giant CAA. At latest follow up in March 2026, CAAs along with axillary artery aneurysms are persisting but regressed in size.

Conclusion: This study presents one of the largest cohorts of KD patients with long-term follow-up data from South India. A delay in diagnosis was seen in 31.69 %. CAAs were documented in 45.3 %(n=68), with giant CAAs in 5.3% (n=8). A few cases were super-refractory warranting multiple immune modulators. Infants were more likely to have IVIG refractory disease (p= 0.0160) and presence of CAA at diagnosis increased the risk of

IVIG refractoriness ($p=0.0020$). On long-term follow-up, most aneurysms showed regression, while 8 patients (11.76%) continued to have CAAs.

Table 1. Characteristics of 150 patients with Kawasaki disease

Total number of KD cases	150
Mean age	42.98 months (2-288)
Gender	
Male (M)	91 (60.67%)
Female (F)	59 (39.33%)
M: F	1.54:1
Age -	
< 1 year	33 (22%)
1 – 5 years	70 (46.67%)
>5 years	47 (31.33%)
Clinical features	
Complete KD	84 (56%)
Incomplete KD	66 (44%)
Fever	150 (100%)
Oral mucositis	107 (71.33%)
Rash	102 (68%)
Conjunctival Injection	91 (60.67%)
Extremity changes	59 (39.33%)
Cervical lymphadenopathy	50 (33.33%)
KD shock syndrome	7 (4.67%)
IVIG Refractory	43 (28.67%)

Echocardiographic changes	
CAAs	68 (45.3%)
Valvular Regurgitation	6 (4%)
Pericardial Effusion	4 (2.67%)
LV Dysfunction	2 (1.33%)
Number of CAAs	
LMCA	55 (36.66%)
LAD	46 (30.66%)
RCA	22 (14.66%)
LCX	18 (12.01%)
Based on aneurysm size	
Small CAA	38 (25.3%)
Moderate CAA	22 (14.7%)
Giant CAA	8 (5.3%)
Treatment received	
MPS	71 (47.33%)
Infliximab	36 (24%)
Cyclosporine	6 (4%)
Anakinra	3 (2%)

(KD-Kawasaki Disease, IVIG-IV Immunoglobulin, MPS -Methyl Prednisolone, LMWH -low-molecular-weight heparin, CAA-coronary artery aneurysm, LMCA- Left Main Coronary Artery, LAD-left Anterior Descending Artery, RCA- Right Coronary Artery, LCX- Left Circumflex Artery)

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Anakinra	3 (2%)

Title: Economic burden of Kawasaki Disease: a prospective cohort study from North India

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Aims: Kawasaki disease (KD) is a treatable childhood vasculitis, yet delayed recognition may result in coronary artery abnormalities (CAA) and prolonged follow-up. In India, where families often pay out of pocket, the economic burden is poorly quantified. We estimated direct medical, direct non-medical and indirect costs of KD and assessed the impact of CAA.

Methods: In this study undertaken at PGIMER Chandigarh, children aged 1 month to 12 years with KD were enrolled from January 2025 - June 2026 and followed until 3 months post-discharge. Costs before admission, during hospitalisation, and at 2-week, 6-week, and 3-month visits were recorded through structured interviews.

Results: A total of 59 children were enrolled; the median age was 30 months and 37 children (62.7%) were boys. Coronary artery abnormalities were present in 21 (35.6%) patients. Median cumulative expenditure was ₹1,47,905 (USD 1,568), with hospitalisation as the dominant cost phase and direct medical costs bearing the largest component. The presence of CAA significantly increased the burden: children with CAA spent ₹2,67,991 (USD 2,840) versus ₹1,17,202 (USD 1,242) without CAA, more than doubling family expenditure; $p < 0.001$. This excess extended beyond hospital bills to non-medical costs, productivity loss and out-of-pocket (OOP) spending. Caregivers lost a median of 60 work hours, amounting to a median loss of income of ₹10,000 (USD 106) during hospitalisation. This corresponded to approximately 20% of monthly family income lost. Younger age and thrombocytosis were associated with CAA; leukocytosis and thrombocytosis independently predicted coronary involvement. On bivariate analysis, total OOP expenditure was significantly associated with the absence of a health insurance scheme and the presence of thrombocytosis.

Conclusion: This is the first Indian study to systematically assess the economic burden of KD from the perspectives of patients and their families and addresses an important knowledge gap. KD imposes substantial financial strain even in a federally funded tertiary hospital. Preventing CAA through early diagnosis, timely IVIG, affordable echocardiography and stronger financial protection is essential to protect both coronary arteries and family livelihoods.

Title : Kawasaki Disease in In Infants Versus Older Children : A comparative single centre study from Northeast India

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Objectives : To compare the clinical presentation, laboratory parameters, coronary artery involvement, treatment and outcomes of Kawasaki disease in infants aged <1 year with those of children aged ≥1 year in a tertiary care centre in NE India

Methods : A retrospective comparative observational study was conducted in the Dept of Paediatrics, JNIMS, Imphal by reviewing hospital records over a period of 9 years from 2018 to 2026. Children diagnosed with Kawasaki were divided into two groups: infants aged <1 year and older children aged ≥1 year. Clinical, laboratory, echocardiographic and treatment-related data were analysed. Continuous variables were expressed as median with interquartile range (IQR) and compared using the Mann–Whitney U test, while categorical variables were expressed as frequencies and percentages and compared using Fisher's exact test. A two-sided *p* value <0.05 was considered statistically significant.

Results : A total of 25 children who were diagnosed with Kawasaki Disease were included in the study, of whom 8 (32.0%) were infants and 17 (68.0%) were older children. Amongst them, 14 (56%) are males and 11 (44%) are females. Among the infants, 62.5% are males and 37.5% are females while 52.9% are males and 47.1% are females in older children. Overall median age was 3.0 years (IQR: 0.7 – 4.5 years). Median age of infants with KD was 0.5 years (IQR: 0.5 – 0.625 years) and 4.0 years (IQR: 3.0 – 5.6 years) for older children. Cases were seen throughout the year with predominantly seen during spring and summer months (*p* = 0.303). Median duration of fever at presentation was 7.0 days (IQR 4.75–11.25) in infants and 6.0 days (IQR 5.0–9.0) in older children (*p*=0.976), while median hospital stay was 8.5 days (IQR 5.75–9.75) and 10.0 days (IQR 6.0–12.0), respectively (*p*=0.724).

Complete KD was diagnosed in 37.5% of infants compared to 82.4% of older children, whereas incomplete/atypical KD was more frequent in infants (62.5% vs 17.6%; *p*=0.061). Conjunctival involvement was the commonest clinical feature, occurring in 100% of infants and 94.1% of older children, followed by rash (100% vs 88.2%) and mucosal involvement (75.0% vs 100%). Lymphadenopathy occurred in 50.0% vs 70.6%, respectively. However, peripheral edema was seen in none of the infants and only 11.8% of the older children. BCG reactivation (37.5% vs 5.9%; *p*=0.081) and diarrhoea (50.0% vs 11.8%; *p*=0.059) were more frequent among infants. Two children had associated dengue infection, a left gluteal abscess.

Coronary artery abnormalities were present in 3/8 (37.5%) infants and 7/17 (41.2%) older children (*p*=1.000). In infants, medium and giant aneurysms were seen in 12.5% and 25.0%, respectively, with no small aneurysms. In older children, small and giant aneurysms were observed in 23.5% and 17.6%, respectively, while no medium aneurysms were detected.

Laboratory evaluation showed significantly higher leukocyte counts in infants, with median TLC $22,570/\text{mm}^3$ (IQR 20,807.5–24,462.5) compared to $13,630/\text{mm}^3$ (IQR 10,900–16,420) in older children ($p=0.001$). Median platelet count was higher in infants (376.5 vs $235 \times 10^3/\text{mm}^3$), although not statistically significant ($p=0.076$).

All patients received intravenous immunoglobulin (IVIG). IVIG was administered at a median of 8 days (IQR, 6.25–10) of fever in infants and 6 days (IQR, 6–10) in older children ($p = 0.790$). IVIG resistance was documented in one older child. Aspirin was administered to all infants and 94.1% of older children. Steroids were used in 50.0% of infants and 29.4% of older children. Infliximab was used in 37.5% and 23.5%, cyclosporine in 12.5% and 17.6%, enoxaparin in 37.5% and 17.6% respectively.

Conclusion : Kawasaki disease in infants demonstrated a distinct clinical phenotype, with a substantially higher proportion of incomplete/atypical presentations and greater frequency of gastrointestinal manifestations and BCG reactivation. Coronary artery abnormalities occurred in both age groups, emphasizing the importance of early echocardiographic assessment irrespective of age. Early recognition and prompt treatment are essential to minimize the risk of cardiovascular complications.

Title: Gut Microbial Dysbiosis and Immune Remodelling After Intravenous Immunoglobulin in Indian Children with Kawasaki Disease

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Introduction

Kawasaki disease (KD) is an acute childhood vasculitis in which gut microbial dysbiosis may contribute to systemic inflammation and immune dysregulation.

Aims

To evaluate gut microbial composition, cytokines and T cell subsets balance in Indian children with KD before and after intravenous immunoglobulin (IVIg) treatment.

Methods

Forty-one children with KD were studied during the acute pre-IVIg phase and after IVIg. Median age was 3.0 years (IQR 1.0–6.0), and 31 (75.6%) were male. Gut microbiota was assessed by 16S rRNA sequencing, cytokines by ELISA and T cell subsets (Th1, Th2, Th17, Tregs) by flow cytometry.

Results

Pre-IVIg KD showed gut microbial dysbiosis, with high *Enterococcus* abundance ($30.53 \pm 36.40\%$) and lower abundance of commensal genera including *Blautia* ($4.02 \pm 7.57\%$), *Faecalibacterium* ($6.65 \pm 14.77\%$), *Bifidobacterium* ($34.20 \pm 26.41\%$) and *Lactobacillus* ($1.83 \pm 2.52\%$). After IVIg, *Enterococcus* decreased to

4.14 ± 10.25% (p=0.0002), while *Blautia* increased to 9.91 ± 9.71% (p=0.0008), *Faecalibacterium* to 13.64 ± 17.07% (p=0.059) and *Bifidobacterium* to 47.31 ± 20.93% (p=0.062). Shannon diversity increased from 7.7207 ± 0.7869 to 8.2076 ± 0.3040 (p=0.0034), and beta diversity differed after IVIg (PERMANOVA F=3.54, p=0.0023). Cytokine profiling revealed elevated baseline levels of inflammatory and regulatory mediators. After IVIg, IL-6 decreased from 389.70 ± 1056.63 to 72.30 ± 260.39 pg/mL (p=0.0020), IL-17A from 3.65 ± 3.41 to 1.23 ± 1.18 pg/mL (p=0.0166) and IL-10 from 7.97 ± 11.32 to 1.31 ± 1.35 pg/mL (p<0.0001), while TGF-β1 remained elevated (674.87 ± 302.39 to 634.13 ± 274.68 pg/mL; p=0.5118). Overall, cytokine profiling showed a significant post-IVIg decline in IL-6, IL-17A, and IL-10, while TGF-β1 remained persistently elevated.

Th1 and Th2 frequencies decreased significantly post-IVIg (11.7% to 2.7%, p=0.036; 4.3% to 1.2%, p=0.016), while Th17 remained unchanged (all p>0.45). Unsupervised FlowSOM clustering showed a marked reduction in CD8⁺ Tc17-like cells (1.38% to 0.01%), whereas CD4⁺ Th17 cells remained stable (41.75% to 46.02%). FOXP3 expression assessed by mean fluorescence intensity (MFI), showed a trend toward lower expression in pre-IVIg patients compared with HC (803.5 vs. 1906.0).

Conclusion

Acute KD was characterised by gut dysbiosis, cytokine imbalance, and altered immune regulation. IVIg was associated with restoration of microbial diversity and reduced inflammatory cytokines. Th1, Th2, Tc17-like and Treg frequencies responses showed a downward trend, while CD4⁺ Th17 remained relatively stable, indicating resolution of inflammatory state.

Monocyte Heterogeneity in Kawasaki Disease: Insights from a Pilot Cohort

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Introduction: Kawasaki disease (KD) is an acute, self-limited vasculitis of childhood and the leading cause of acquired heart disease in children. Previous studies have highlighted the role of immune cells like monocytes, macrophages and CD8 T cells in KD, particularly their involvement in the form of CAAs. Monocytes/macrophages are key effectors of the systemic inflammatory response in KD. The monocyte subsets-classical (CD14⁺⁺CD16⁻), intermediate (CD14⁺⁺CD16⁺), and non-classical (CD14⁺CD16⁺⁺)- differ in cytokine profile and vascular-injury potential. Intravenous immunoglobulin (IVIG) is first-line therapy for KD, but its effect on the relative distribution of circulating monocyte subsets is not well characterized. IVIg may exert its effects by modulating immune cell communication and inflammatory responses.

Aims: In order to address the gaps in understanding of monocyte function in KD, the relative frequencies of classical, intermediate, and non-classical monocyte subsets were assessed in children with KD before (pre-IVIg) and after (post-IVIg) treatment.

Methods: Peripheral blood samples were collected from children (between 3 months to 12 years) with KD prior to IVIG infusion (pre-IVIG, n = 13) [Acute phase] and at follow-up after treatment (post-IVIG, n = 13) [Sub-acute phase]. Post IVIg samples were collected after 36-48 hours of IVIG completion EDTA blood samples were stained using a panel of monoclonal antibodies (CD45, CD16, CD14, HLADR, CD11b) to discriminate classical, non-classical and intermediate monocytes using stain and fix protocol. Samples were analysed by multicolour flow cytometry where CD45⁺ monocytes were gated and further resolved into classical, intermediate, and non-classical subsets, expressed as a frequency of the parent monocyte gate. Pre- versus post-IVIg values were compared using a paired t-test and Wilcoxon signed-rank test on matched patients; significance was set at $p < 0.05$.

Results: In the present pilot cohort (n=13), classical monocytes remained the predominant circulating monocyte subset both before and after IVIg treatment, with no significant change following therapy. However, the intermediate monocytes were decreased after IVIg treatment, whereas non-classical monocytes were elevated. Since the intermediate monocytes decreased in our cohort in sub-acute phase thus results suggest that IVIg may serve to shift the pro inflammatory environment following the treatment

Conclusion: The pilot data indicates that IVIg is associated with circulating monocyte heterogeneity in children with KD. The reduction in intermediate monocytes observed

in our cohort may be associated with attenuation of systemic inflammation following IVIg treatment.

Clinical Profiles and outcomes of Kawasaki Disease: An 8 ½ year observational study from tertiary hospital in Manipur

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Abstract

Introduction: Kawasaki disease (KD) is an acute childhood vasculitis with potential coronary artery complications. Data from North-East India, particularly Manipur, are limited. This study describes the clinical profile, treatment, and outcomes of KD in children in Manipur.

Aims : To study KD phenotype, treatment response, clinical epidemiology in our population.

Methods: A retrospective observational study was conducted at a tertiary care hospital from January 2018 to July 2026 over 8 ½ years. Children diagnosed with KD according to American Heart Association criteria were included. Demographic, clinical, laboratory, echocardiographic, treatment, and outcome data were analyzed.

Results: Sixty-two children were included, with a median age of approximately 3 years. Males predominated (70%). Incomplete KD was more common (58%), particularly among infants. Mucositis was the commonest clinical feature (90%), followed by rash (73%) and extremity changes (68%). Most cases occurred during the summer-monsoon period. Cardiac involvement occurred in five children, including four with coronary artery abnormalities. All patients received IVIG and aspirin; 13 required steroids and two required repeat IVIG. All patients improved, with no mortality.

Conclusion: KD in Manipur showed a marked male predominance and a high frequency of incomplete disease, especially among infants. Early recognition and timely treatment are essential to prevent cardiac complications. Further prospective surveillance is needed to better define the disease pattern in the region.

Introduction

Discovered in 1967 by Japanese pediatrician – Tomisaku Kawasaki as “Mucocutaneous Lymph Node Syndrome”, it is an acute febrile illness of early childhood characterized by systemic vasculitis of the medium-sized arteries with special predilection for coronary arteries¹. It is the leading cause of acquired heart disease both in developing and developed countries^{2,3}.

The highest rate globally is reported in Japan with an estimate of 264 per 100,000 children less than 5 years⁴. South Korea reported the second highest incidence rate (134.4 per 100,000 children less than 5 years)⁵. Taiwan being the third highest with an estimated incidence of (82.8 per 100,000 children less than 5 years)^{6,7}. In USA, the incidence is estimated to be 17 - 21 per 100,000 children less than 5 years old⁸. European countries report an incidence rate less than 16 per 100,000 children less than 5 years old; China reported incidence varies between 7.06 and 55.1 per 100,000 children less than 5 years^{9,10}.

In 1977 first case reporting was seen in India¹¹⁻¹³, two case series was published in 1997 from north India and Trivandrum, Singh et al and Narayana et al^{14,15} respectively, since then there has been immense rise in the number of cases as well as in works and studies on KD. In India, Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh is contributing most of the studies on KD.

First phase of PGIMER, Chandigarh study by Singh et al showed increasing incidence of KD from 1994 (0.51/100,000) to 2008 (4.54/100,000) in children aged <15 years¹⁶. The second epidemiological study from 2009 to 2014 reported incidence rate of 5.35/100,000 children under the age of 5 years¹⁷. In the third phase Pilani et al during (2015–2019 (5 years) study, Chandigarh had 83 cases (15.4%; 66 males, 17 females), the incidence rate of KD in Chandigarh was 5.64–9.87 per 100,000 children under 5 years old, and 2.65–5.07 per 100,000 children under 15 years old¹⁸.

From North-East India Sharma et al's study from April 2017 to October 2019 showed median age of 3 years with male predominance and cardiac complication in 26%¹⁹. In Manipur first case was detected in 2005, ever since we have been noticing increased in the trend as clinician are aware of the disease, our study is curved out of curiosity for disease phenotype and outcome in our population for optimum care.

3. Methodology

- **Study Design**

This is a retrospective observational study in a Tertiary Pediatric hospital – Mother's Care Children Hospital and Research Centre using Records from January 2018 to July 2026 (8½ years). Data regarding age, gender, topographic-valley and hills, seasonal variations, concurrent infections and treatment responses were collected along with investigations, 2D-Echocardiography reports using Z-score for calculating coronary artery size as given by Dallaire and colleagues²⁰ in Microsoft Excel and analyzed.

- **Research Objectives and Questions**

1. Is the treatment response different in the KD phenotype of our population.
2. Clinical epidemiology of KD in paediatric population of Manipur
3. Tractable signs and symptoms for early diagnosis and management

Inclusion criteria

Cases which was diagnosed as per criteria given by the American Heart Association(AHA- 2004)^{1,21}AHA-2017²² were included.

Classical KD/Complete KD: Fever for 5 days together with 4 out 5 principal clinical features in absence of other disease.

1. Conjunctivitis - non exudative, bilateral
2. Rashes- maculopapular, diffuse erythema, erythema multiforme-like
3. Erythema and edema of limbs (acute stage)/periungual desquamation (subacute stage)
4. Cervical lymphadenopathy (> 1.5 cm) usually unilateral
5. Mucositis: lips cracking, strawberry tongue, erythema of oropharynx

In presence of fever and coronary artery involvement on 2D-Echocardiography, less than 4 of the 5 principal clinical criteria is sufficient for diagnosis of KD

Incomplete KD: Presence of fever with less than four of the five principal clinical criteria with compatible laboratory or echocardiography findings suggest incomplete KD²² as given below.

Fever ≥ 5 d + 2–3 KD features OR Infant ≤ 6 months + fever ≥ 7 d



CRP ≥ 3 or ESR ≥ 40 ?



≥ 3 supplemental laboratory criteria?

- Anaemia
- Platelets $\geq 450,000/\text{mm}^3$ (after day 7)
- Albumin ≤ 3.0 g/dL
- Elevated ALT
- WBC $\geq 15,000/\text{mm}^3$
- Urine WBC $\geq 10/\text{hpf}$

OR

- Echocardiogram positive



Positive → TREAT KD

Negative → Reassess / repeat ECHO

Exclusion criteria

Forty-five cases presenting with features of Kawasaki disease following Covid-19 infection fitting to KD-phenotype of Multisystem Inflammatory Syndrome in Children (MIS-C) were excluded

• Ethical Considerations

Ethical approval was obtained from Research Ethical Committee before collecting retrospective data and analysis.

4. Results

Epidemiology and Demographics

A total of 62 patients were included, Median age on presentation was 3 years, mostly seen among infants, followed by 1-6 years, and fewer thereafter. Significant male predominance was noted, 44 (70%) were male, 18 (30%) were female with the ratio of 3.8:1. More children were reported from valley districts (44, 71%) compared to hill districts (16, 25%), two (3%) were non-local residents, Imphal west district had the maximum cases.

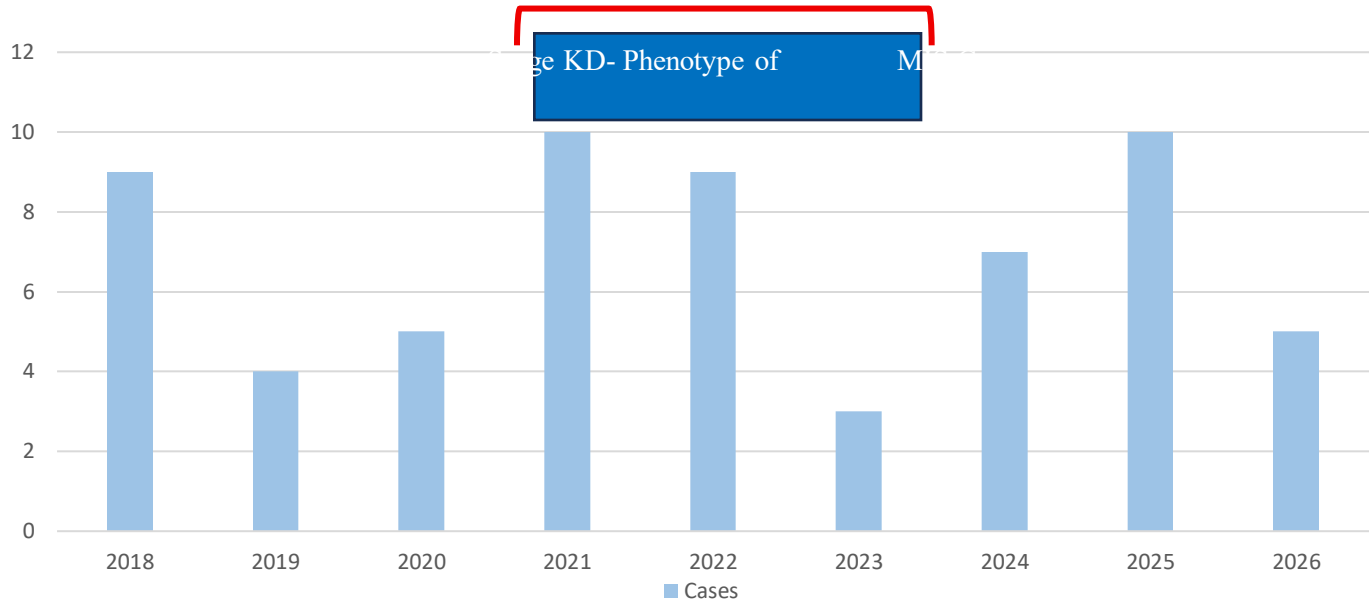
Twenty-seven had complete KD (42 %) and 35 (58%) had incomplete KD. Incomplete KD was more among the infant. Mucositis was the most common sign, followed by rashes, extremity changes. Five children had cardiac involvement; 4 had coronary artery abnormality (CAA), among these four children, one also had myocarditis and the 5th child had isolated pericardial effusion. Three children had shock without any cardiac involvement. Concurrent infection most commonly seen was AGE followed by ARI. Mean duration of fever at presentation was 5 days, more than 50% were diagnosed within 5 days of fever onset. Most cases of Kawasaki Disease were observed during the summer -monsoon (June- August) seasons, followed by winter (Nov-Feb) [Table:1]. Median CRP, TLC, ESR, Hb and platelet were calculated from the available data: 121 mg/dl, 1550/cumm, 72 mm per 1st hour, 10 gm/dl and 3.2 lakhs/cumm respectively. We have done D-dimer & Pro BNP in selected patients [Table:1].

Yearly distribution: No significant variation in yearly distribution was noted however after COVID-19 we noted a surge in KD- phenotype of MIS-C (45 case) which we excluded in our study [Fig:1].

Treatment and Outcome:

All the children received IVIg and aspirin, 13 children were given steroid as there was persistent fever spikes after IVIg or with cardiac involvement. Two child received 2nd dose of IVIG as they showed persistent signs & symptoms. All improved following treatment, few are under follow up till date [table:3]. Median duration of stay was 5.5 days.

Fig 1: Yearly Distribution



	Total =62	Findings
Age 1-6 yrs 6-10yrs >10 yrs		32(52.4%) 24 (39.5%) 5(6.5%) 1(1.6 %)
Gender - Male - Female		44 (70%) 18 (30%)
Demography - Valley - Hills - Outsider		44 (71.5%)- Imphal west highest-30% 16 (25.5%) 2 (3%)
Classification - Complete - Infants 1- 6 years >6 years - Incomplete - Infants 1-6 years >6 years	27(42%) 35 (58%)	13(48%) 12(44%) 2(8%) 20(57%) 13(37%) 2(6%)
Median days of diagnosis < 5 days 5-7 days >7 days		33 (53%) 13(21%) 15(25%)
Systemic /Cardiac - KD Shock - Cardiac -CAA		3 4 (6.4 %) (one had myocarditis), ages- 1, two 3 years and 9 all in complete KD

-Pericardial effusion		1 (Incomplete KD)
Concurrent infection AGE ARI ARI+AGE UTI		19 8 4 5 (Culture proven in 3)
Investigation CRP ESR TLC Platelet Pro- BNP D-dimer	48 45 45 45 12 6	Median 121mg/dl 72 mm per 1st hour 1550/cumm 3.2L/cumm 1154pg/ml 2008 ng/ml
Seasonal peak Summer- monsoon Winter Spring Autum		50 %(Peak) 18% 17% 15%

Clinical profile Mucositis - lips, tongue, oropharyngeal Rashes Extremity changes Non-exudative conjunctivitis Unilateral Lymphadenopathy Bacille Calmatte Guerin (BCG) scar activation		55(90%). 45 (73%) 42 (68%) 40 (65%) 13 (21%) 2 (3%)
Treatment IVIG+Aspirin IVIG + Aspirin+ Prednisolone Repeat IVIG		62 13(5 infants) 2
Table 1: Clinico-epidemiological profile		

4. Discussion

A total of 62 cases were identified in our Paediatric Centre; cases are increasing ever since 1st case was detected in 2005 as clinician are aware and parents are more health educated. More awareness has to spread among medical officers working in the periphery for early detection and reduction of complications.

Our cohort had similar male predominance like most studies- Assam-Sharma et al¹⁹, Chandigarh studies- Pilani et al, Pilani et al^{18,23}, Bangalore study-²⁴ and Japanese study²⁵. Median age of presentation our cohort was 3years same as Assam, this might be due to close geographical proximity and 3years plus few months was seen in Chandigarh 3rd phase and Bangalore but Japanese study was younger median age. Our median days of diagnosis from fever onset was lesser compared to other studies indicating health awareness among the parents and health care providers.

We had more of incomplete KD as our cohort had more infants which is similar to Bangalore study²⁴ however they had more severe disease profile and more cardiac involvement in infants which we didn't had. Most common clinical feature was oral mucosal involvement in most studies followed by rashes or extremities changes. KDSS per se percentage wise was more in Chandigarh and Bangalore studies. Cardiac involvement in our cohort was comparatively quite low, highest CAA was seen in Bangalore study and highest pericardial effusion was in Assam.

Seasonal variation of our cohort was same as that of Japan (June- Augst) whereas Chandigarh had (October-December). Japan and Chandigarh had post covid surge in the cases whereas we saw surge in KD-phenotype of MIS-C, 45 cases in our cohort. Most of our patient responded well IVIG with aspirin, adjuvant oral prednisolone was needed in 13(21%) for persistent fever after IVIG and only 2(3%) required 2nd IVIG for persistent signs symptoms unlike other studies requiring higher biologics and immune- suppressive. [Table:2].

	Our study (n=62)	Sharma et al - Assam ¹⁹ (n=73) 2017-19	Pilani et al - PGIMER ¹⁸ (n=83) 2015 -19	Pilani et al - PGIMER ²³ (n=60) 2020 -24	Bhattad et al - Bangalore ²⁴ (n=39) 2017-19	Ae et al - Japan ²⁵ (n=29841) 2023-24
Median/mean age (yrs/months)	3	3	4	3yrs 4months	Mean- 3 yrs 6 months	2
Male dominance	70%	66%	79%	62%	69%	57%
Classification (complete)	41%	73%	57.8%	63%	48%	80%
Infants	53%	-	-	-	33%	16.5%
Infants with Incomplete KD	57%	-	-	-	64%	-
Mean/ Median days of fever	Median-5.5	Mean-8.5 days	Median-9.4 days	-	-	-
Symptoms -Mucositis -Rashes -Extremity changes -Non-exudative conjunctivitis -Unilateral Lymphadenopathy	90% 73% 68% 65% 21%	87% - 79% 54% 60%	-	-	90% 87% 59% 71% 37%	-
KDSS	0.05%	0.013%	7%	-	3%	-
Cardiac -CAA -Myocarditis -Pericardial effusion	4 (6.4%) 1 1	15(20%) 1 11(15%)	14(16.9%) 2 -	13% - -	17(43.6%) - 1	CAA-First visit-3.8%, subacute-2%
Seasonal peak	Jun-Aug	-	Oct- Dec	Oct-Dec	-	Jun-Aug
Treatment IVIG ASP PNL IFX Repeat IVIG Pulse MP	100% 100% 21% - 2 -	93% 90% - 8 - 2	89% 89% 2 4 - 2 CsC+Steroid+IFX-1	-	100% - 5 - 3	96.6% IVIG +Steroid-15%
Post covid variation	Surge of KD phenotype MIS-C	-	-	Increased	-	Increased

Table 2: Comparisons of results

PE-Pericardial effusion, CAA-Coronary artery abnormalities, KDSS- KD shock syndrome, ASP-Aspirin, IFX-Inflaximab, PNL- Prednisolone, Pulse-MP-Pulse Methylpred, CsC- Cyclosporine

Limitations of the Study:

Data of a single Paediatric Hospital in Manipur

Future Directions for Research

Institutional Registry for KD in our hospital was started from July 2025 and still on progress for study in future cases and continue follow up will shed light on this disease and awareness in general public and other health care worker.

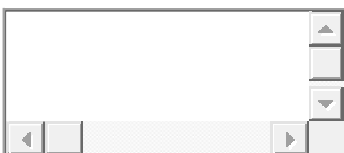
Conclusion

- Our study highlights some different epidemiological pattern- more Incomplete KD in our cohort as we had more infants, good response to treatment not requiring higher biologics and immune- suppressive drugs, less cardiac involvement and summer- monsoon peak compare to mainland India.
- With such increasing number of cases causing serious cardiac complication, not only institutional record keeping registry a national registry is the need of the hour.
- For early diagnosis active evaluation of mucositis, rashes and conjunctival congestion in a febrile child/ infant without clinical focus has to be prioritised.

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Presenting Features and Clinical Severity of Early Versus Late Presentation in Kawasaki Disease: analysis of data over last 5 years

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Background:

Coronary artery aneurysms (CAA) are the most important complication of Kawasaki disease (KD). Delayed recognition and treatment may increase the risk of clinically significant coronary involvement, but the relationship between presentation timing, clinical features and coronary outcomes in Indian children remains insufficiently described.

Objectives:

To compare presenting features and coronary outcomes between early and late presenters with KD and describe five-year trends in delayed presentation, treatment strategies and coronary involvement.

Methods:

We conducted a retrospective cohort study of children diagnosed with KD at a tertiary paediatric centre between 2021 and 2025. Patients were classified by fever duration at admission as early presenters (<7 days) or late presenters (≥ 7 days). Demographic, clinical, laboratory, echocardiographic, treatment and outcome data were analysed. Coronary involvement was assessed using serial echocardiography and coronary artery Z-scores. Coronary abnormalities, treatment escalation and temporal trends were compared between groups and across study years.

Results:

Among 167 evaluable children, 75 (44.9%) were early and 92 (55.1%) late presenters. Late presentation increased from 40.0% in 2021 to 69.0% in 2025. Median age, sex distribution, incomplete KD and atypical KD were comparable between groups.

Any CAA occurred in 42.7% of early versus 54.3% of late presenters. Clinically significant coronary disease was more frequent among late presenters: moderate/medium CAA occurred in 4.0% versus 17.4% ($p=0.007$), and multiple CAA in 12.0% versus 26.1% ($p=0.031$), respectively. Giant CAA was also more frequent among late presenters (4.0% vs 8.7%), although this difference was not statistically significant.

Management evolved toward greater use of intensified immunomodulation and coronary-directed therapy in selected high-risk or refractory patients. Cyclosporine use increased from 2.7% among early presenters to 10.9% among late presenters, while LMWH use increased from 6.7% to 16.3%. Year-wise treatment and coronary outcome analyses remain pending.

Conclusion:

Late presentation was associated with a greater burden of clinically significant coronary disease, particularly moderate/medium and multiple aneurysms. The increasing proportion of late presenters highlights persistent challenges in early recognition and referral. Earlier diagnosis, prompt IVIG-based treatment and risk-adapted escalation remain essential to reducing coronary morbidity in children with KD.

RISK SCORE TO PREDICT CORONARY ARTERY ANEURYSM IN KAWASAKI DISEASE FROM A SINGLE CENTRE IN EASTERN INDIA.

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BACKGROUND/AIM: Coronary artery aneurysms (CAA) remain the most important complication of Kawasaki disease (KD). Existing risk scores have shown inconsistent performance across different populations. We aimed to develop a simple pre-treatment clinical risk score for predicting CAA in Indian children with KD

METHODS: Data of consecutive KD patients admitted at Institute of Child Health, Kolkata, between January 2020 to October, 2025 were retrospectively analysed. Data were classified into CAA (Z score $\geq 2.5z$ within 6 weeks of disease onset) and Non CAA control group. To eliminate the treatment-related confounding effects, patients who received additional immunomodulator therapy (pre-emptive or rescue) and IVIG resistant patients were excluded from control group.

RESULTS: A total of 166 patients were included (92 CAA and 74 non CAA). Univariate analysis showed age ≤ 12 months, male, day at illness (DOI) at diagnosis, total leukocyte count (TLC), albumin, C-Reactive protein (CRP), Alanine transaminase as significant. Multivariate analysis identified age, male, DOI at diagnosis, albumin as significant. ROC analysis was used to determine optimal cut-offs for continuous variables. Significant variables from univariate analysis/biological plausibility were used for score derivation. Points were allocated (1 or 2 points) according to odds-ratio and multivariate independence. A six variable pre-treatment score was thus derived: Risk Factor(Point Allocated) : Age ≤ 12 months(2), male sex(2), DOI

diagnosis >12 days(2), albumin <3.5 g/dL(2), CRP >109 mg/L(1), and total leukocyte count >21,900/ μ L(1) (maximum score 10). A cut-off of ≥ 4 demonstrated good discrimination with an score AUC of 0.768, sensitivity of 81.7%, specificity of 78.8%, LLR $p < 0.001$. No significant multicollinearity was observed (VIF < 4)

CONCLUSION: We developed a simple pre-treatment risk score using routinely available clinical and laboratory variables that demonstrated good discrimination for predicting CAA in children with KD. External validation is warranted to establish its generalisability before routine clinical use.

Risk Factor	Threshold	Points	Basis
Age at Onset	≤ 12 months	2	Youden optimum; $p=0.02$, OR: 2.27, meta-analytic evidence, Independent on multivariate analysis
Gender	Male	2	OR 2.04, $p=0.043$; meta-analytic independent predictor ($p=0.004$), Independent on multivariate analysis
DOI at Diagnosis	>12 days	2	Youden optimum; strongest categorical OR 3.78 ($p=0.008$); independent predictor ($p=0.008$), Independent on multivariate analysis
Albumin	<3.5 g/dL	2	Strongest predictor; OR 3.43 ($p < 0.001$); multivariate OR 0.095 ($p < 0.001$), Independent on multivariate analysis
CRP	>109 mg/L	1	Youden optimum; OR 2.48 , $p=0.008$, not independent on multivariate analysis
TLC	>21,900 cells/ μ L	1	Youden optimum; OR 4.19 , $p=0.001$, not independent on multivariate analysis
MAXIMUM	—	10points	All pre-treatment; single decision point

Rethinking Aspirin Dose in Kawasaki Disease: Clinical and Coronary Outcomes with Low-Dose Aspirin from Treatment Initiation in the IVIG Era

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INTRODUCTION:

Intravenous immunoglobulin (IVIG) is the cornerstone of Kawasaki disease (KD) therapy, yet moderate–high-dose aspirin remains widely used during the acute phase despite uncertain incremental anti-inflammatory benefit and dose-related toxicity. Indian data evaluating low-dose aspirin (3–5 mg/kg/day) from treatment initiation are limited, contributing to heterogeneous practice.

AIMS:

To evaluate clinical response, inflammatory marker resolution, safety and serial coronary artery outcomes in children with KD treated with low-dose aspirin from initiation, and compare outcomes with published moderate–high-dose aspirin cohorts.

METHODS:

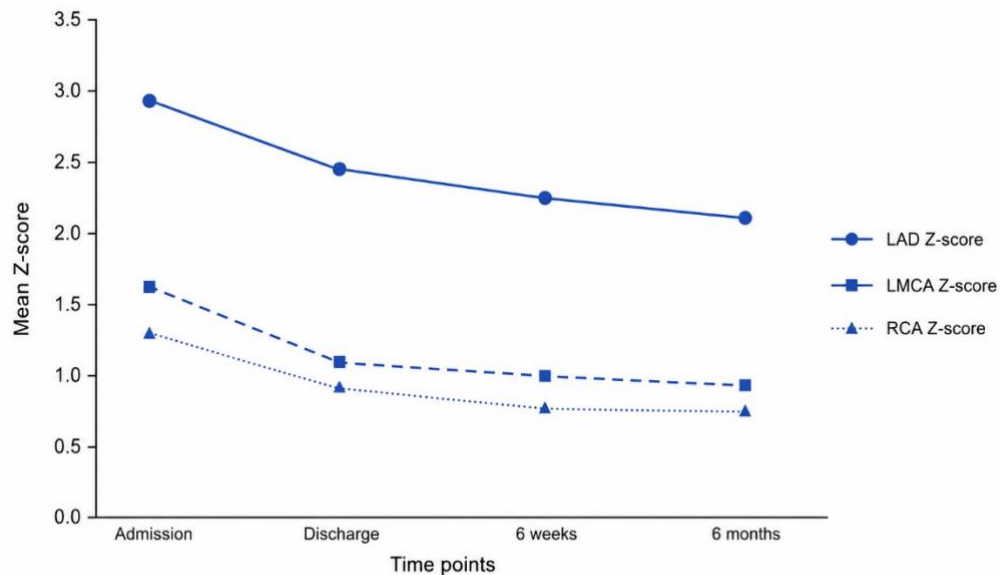
This observational study at a tertiary paediatric rheumatology centre included 84 children with KD diagnosed according to AHA criteria. All received low-dose aspirin. Of 84 children receiving low-dose aspirin, 24 receiving IVIG (2 g/kg) without adjunctive immunomodulation constituted the primary treatment-response cohort; the remaining 60, who required adjunctive therapy like steroids/infliximab/cyclosporine were analysed separately and were not included in the primary coronary comparison.

Fever response, inflammatory markers, adverse events and serial left anterior descending (LAD), left main coronary artery (LMCA) and right coronary artery (RCA) Z-scores at admission, discharge, 6 weeks and 6 months were evaluated against published international moderate–high-dose aspirin data.

RESULTS:

Among the overall cohort (n=84), mean pre-admission fever duration was 8.14±4.86 days and aspirin-related gastrointestinal adverse events occurred in 2 children (2.38%). In the primary IVIG + low-dose aspirin cohort (n=24), coronary Z-scores improved following treatment: mean LAD Z-score decreased by approximately 16.5% from admission to discharge, closely paralleling the 16.7% reduction reported in published moderate–high-dose aspirin cohorts. Mean LMCA Z-score decreased by approximately 31% by discharge, while mean RCA Z-score decreased by approximately 20% by 6 weeks, with subsequent stabilisation through 6 months. CRP declined following IVIG, and mean hospital stay was 6.09 days. Serial coronary trajectories were broadly comparable with published moderate–

high-dose aspirin cohorts, without evidence of superior coronary outcomes with higher aspirin doses.



Serial coronary artery Z-scores (LAD, LMCA, RCA) following IVIG and low-dose aspirin. Early improvement is seen by discharge/6 weeks with stabilization through 6 months.

Serial coronary Z-score trajectories following IVIG and low-dose aspirin demonstrate early coronary improvement followed by stabilisation through 6 months. Comparable trajectories in published moderate–high-dose aspirin cohorts suggest limited incremental coronary benefit from aspirin dose escalation.

CONCLUSION:

Low-dose aspirin initiated with IVIG was associated with prompt clinical recovery and favourable six-month coronary outcomes comparable with published moderate–high-dose aspirin cohorts. The concentration of coronary improvement in the immediate post-IVIG period, followed by sustained stabilisation, supports IVIG as the dominant anti-inflammatory component of therapy and questions the incremental value of escalating aspirin solely for anti-inflammatory effect. In the context of heterogeneous aspirin practices and limited indigenous evidence, these findings provide clinically relevant Indian data supporting a lower-exposure aspirin strategy that may reduce treatment burden without compromising coronary outcomes. Multicentric prospective studies are warranted to inform standardisation of acute-phase aspirin dosing in Indian children with KD.