RESEARCH BRIEF

Factors Associated With Delay in Diagnosis of Kawasaki Disease in India

S BALASUBRAMANIAN, MANI RAM KRISHNA, K DHANALAKSHMI, SUMANTH AMPERAYANI, *AV RAMANAN

*From Kanchi Kamakoti CHILDS Trust Hospital and the CHILDS Trust Medical Research Foundation, 12, Nageswara Road, Nungambakkam, Chennai 600 034, India and *Bristol Royal Hospital for Children, UK.*

Correspondence to:
Dr S Balasubramanian,
Kanchi Kamakoti CHILDS Trust Hospital and The CHILDS Trust Medical Research Foundation, 12, Nageswara Road, Nungambakkam, Chennai-600034, India.
sbsped53@sify.com
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A retrospective analysis was carried out to identify factors associated with delay in diagnosis of Kawasaki disease in a tertiary care pediatric hospital setting in Chennai, India. Over a period of 2 years, a total of 37 cases were studied. The cases were divided into Early Diagnosis Group (EDG) and Delayed Diagnosis Group (DDG) with the cut-off for early diagnosis being ten days. A greater proportion of cases in the EDG presented primarily to our institution (*P*=0.004). In the DDG group greater number of cases had received medical attention from practicing pediatricians prior to referral. There was greater interval in onset of individual symptoms in the DDG group. There was no difference between the two groups with regard to age, gender, total blood counts, CRP, liver enzymes, urine analysis or serum albumin values. Platelet counts were higher in the DDG compared to the EDG (*P*=0.004).Coronary abnormalities were more common in the DDG (*P*=0.05). Our findings suggest that children presenting primarily to a tertiary care centre with symptoms of Kawasaki disease are more likely to be associated with early diagnosis and delay in onset of neck swelling or oral lesions may be associated with delayed diagnosis. There is a need for creating more awareness about Kawasaki disease among practicing pediatricians in India.

Key words: *Diagnosis, Kawasaki disease, Outcome*.

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Kawasaki disease (KD) is a vasculitis which has a penchant for the coronary arteries, with occurrence of coronary artery aneurysms (CAA) in 25% of cases [1]. It is the commonest acquired heart disease among children in the Western world and recent data suggest that the same may be true for our country also [2]. The clinical manifestations of the disease are myriad and this coupled with the lack of a single diagnostic investigation makes accurate diagnosis difficult. Unnecessary delay in the diagnosis increases the risk of coronary aneurysms and increases morbidity in a potentially self-limiting disorder. There is a paucity of Indian literature with regard to factors associated with delayed diagnosis of Kawasaki Disease [2,3]. We report a series of cases of Kawasaki disease with specific reference to factors delaying diagnosis.

METHODS

This was a retrospective analysis of all children diagnosed to have KD at a tertiary care center between August 2009 and July 2011. Clearance was obtained from the Institutional Ethics Committee. A single investigator obtained the history and conducted the physical examination of all the patients after a diagnosis of Kawasaki was made or suspected. An echocardiogram was done as soon as Kawasaki disease was suspected and repeated if fever did not settle after IvIg therapy. All patients also had a follow up echocardiogram at 6 weeks. Diagnosis was established based on the AHA diagnostic criteria for Kawasaki disease [4]. The cases were categorized as into Early Diagnosis (ED) group, if diagnosed before 10 days and Delayed Diagnosis (DD) group if diagnosed later. The data in these two groups were analysed using SPSS v17 with regard to the differences in clinical and laboratory parameters.

RESULTS

A total of 37 children (26 boys) were diagnosed to have Kawasaki disease during the study period. The ages ranged from 4 months to 14 years. 20 (54%) were between 1 and 5 years while 10 (27%) were less than 1 year. 19 (51%) had complete Kawasaki disease satisfying all criteria of the AHA guidelines while 18 (49%) had incomplete disease. 24 (65%) children were in the ED group and 13 (35%) were in the DD group. Coronary artery abnormalities (CAA) on echocardiography were found in 9 children out of which 7(77%) were in the DD group.

All patients referred from outside our hospital were

referred by pediatricians. None of the patients in the DD group was referred as Kawasaki disease while two of 6 patients in the ED group were referred as Kawasaki disease. One child in the ED group developed recurrence of the disease 6 months after the initial attack. 6 children had disease recrudescence. 5 were in the ED group and one of those developed CAA during recrudescence. 34 children were treated with IvIg and two were treated with corticosteroids because of socio-economic considerations. Among children with disease recrudescence, five received a second dose of IvIg while one child received corticosteroids.

Referrals from private pediatricians, lower hemoglobin, higher platelet counts and increased coronary artery abnormalities (CAA) were statistically significant factors associated with delayed diagnosis (***Table* I**). Clustering of symptoms, particularly cervical lymphadenopathy and oral lesions, was associated with early diagnosis.

DISCUSSION

We recognized that referral from pediatricians outside the institute and wide dispersion of symptoms with time were features associated with delayed diagnosis. In particular, onset of neck swelling and oral lesions occurred later in the DD group. The DD group also had lower hemoglobin, higher platelet counts and more CAAs.

TABLE I DIFFERENCES BETWEEN EARLY AND LATE DIAGNOSIS OF KAWASAKI DISEASE

Parameter (mean)	*Early diagnosis (n= 24)*	*Delayed diagnosis (n=13)*
Age (y)		
Onset of findings(d)	2.92	4.33
Fever	1.21 (1-3)	1.31 (1-3)
Conjunctivitis	4.26 (3-7)	4.40 (4-11)
Skin lesion	3.33 (1-8)	3.36 (3-11)
Neck swelling*	3.53 (1-7)	6.14 (5-11)
Oral lesions*	3.39 (3-5)	5.89 (3-12)
Hemoglobin (g %)*	10.4	9.3
TLC (cells/mm^3)	19,375	22,223
ESR (mm/hr)	74.5	90.7
CRP (IU/L))	89.4	44.8
Platelets (in lakhs/mm^3)	4.3	6.4
CAA on ECHO*	2	7
Incomplete KD	10	8
Referral*	6	10

*CRP- C-Reactive Protein, ECHO- Echocardiogram, ESR- Erythrocyte sedimentation rate, KD- Kawasaki disease, TLC- Total leukocyte count; * P<0.05; CAA - Coronary artery abnormalities.*

In our study, 35% of children had delayed diagnosis in comparison to reports from the USA (16-27%) [5-7] and Taiwan (18%) [8]. This illustrates the need for increased awareness among pediatricians in India to the diagnosis and importance of early treatment. Referrals from pediatricians outside our hospital was more in the DD group. Literature provides conflicting data on physician delay in diagnosis. Anderson, *et al*. [5] found no difference between the two groups based on number of physician visits or speciality of treating physician; while others suggested that increased distance from medical center and delay in diagnosis by physicians could be important in delaying diagnosis [6,7]. There were no comments on referral pattern in these studies. This could reflect difference in the style of medical practice, institutional attachments and referral guidelines between India and USA.

We live in an era where classical Kawasaki disease continues to be missed frequently [9] and the prospect of incomplete KD appears more daunting. In our study, though the number of incomplete cases was more in the DD groups, this association was not statistically significant. Similar observations have been reported in literature earlier [5,6,10].

Wider dispersion of symptoms had been reported as a risk factor for delayed diagnosis [5,8]. In our series, wide dispersal of time of onset of cervical adenopathy and oral lesions were significantly associated with delayed diagnosis. Juan, *et al*. [8] noticed higher white blood cell counts in DD group but no such association was found in our study. Children in the DD group had lower hemoglobin in our study. This association has not been reported in the literature. However, platelet counts were higher in the DD group consistent with earlier reports in literature [5,6,8]. CAAs were more common in the DD group. A longer period of inflammation leads to an increased incidence of CAAs [13]. The efficacy of IVIg in reversing inflammation also decreases with prolonged duration of inflammation [14,15].

This is a retrospective analysis carried out at a single private children hospital with no fixed referral population and hence might not be truly indicative of the situation in the entire community. Recent data suggest that incidence of KD is increasing in India [16]. In such a scenario, our observations suggest that improving awareness amongst practicing pediatricians across the community might facilitate early diagnosis and thereby possibly prevent coronary sequelae.

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WHAT THIS STUDY ADDS?

- Children presenting primarily to a tertiary care setting in India are more likely to be associated with early diagnosis of KD than those initially seen by pediatricians in the community.

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