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A prospective study for evaluating mean platelet volume in children diagnosed with chronic tonsillitis and/or adenoid hypertrophy: A study from Central India

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Abstract
Background: Chronic tonsillitis (CT)-adenoid hypertrophy (AH) is the most common cause of obstructive sleep apnea (OSA), which is one of the most common reasons of nocturnal hypoxia in children.
Aims and objective: To evaluate MPV in patients diagnosis with adenoid hypertrophy (AH) and/or chronic tonsillitis.
Materials and Methods: Fifty patients (Case group) who underwent adenoidectomy or adenotonsillectomy with a diagnosis of adenoid hypertrophy (AH) and/or chronic tonsillitis were studied in Department of Otorhinolaryngology & Head and Neck Surgery at Gandhi Medical College and Hamidia Hospital from March, 2015 and August, 2016 and compared with age-matched 50 healthy controls subjects (Control group). Detailed clinical history was recorded for all the patients followed by thorough ENT examination. Confirmation was done using rigid nasal endoscopy and fiber optic flexible endoscopy (FOFE). Mean platelet volume (MPV) were individually assessed.
Results: Majority of the patients belong to the age group of 6-10 years (38%). Male preponderance (56% vs. 54% in cases and control respectively) was observed in present study. MPV was significantly higher among cases (11.26±1.12) as compared to control group (7.74±0.59) (p=0.032). Among cases mean MPV (11.59±0.63) was highest among patients belonging to age group of 2-10 years. MPV among males and females in case cohort was 10.72±1.23 and 10.86±1.14 respectively whereas MPV among female and male of control group was 7.76±0.52 and 7.73±0.49 respectively. No significant difference between MPV of males and females within cases and controls cohort was obtained. Among females, MPV was significantly higher in cases (10.72±1.23) as compared to Control (7.76±0.52) (p=0.012) similarly males in case group (10.86±1.14) had significantly higher MPV as compared to control (7.73±0.49) (p=0.008).
Conclusion: ATH was more prevalent in children who were in first decade of life and males patient. MPV was higher in female children with ATH.

Keywords: mean platelet volume, adenoid hypertrophy, platelet levels

1. Introduction

Adenoid and tonsillar hypertrophy (ATH) is the most common cause of the upper airway obstruction. ATH commonly occurs between the ages of 2 and 12 years and frequently leads to pharyngeal obstruction [1].

Many studies in the literature show that ATH causes hypoxia, pulmonary hypertension, ventricular hypertrophy, systemic hypertension and poorer quality of life [2]. The decision of operation should be given more quickly in children with ATH to prevent complications.

In children, persisting obstruction findings may cause aggressive behavior, anxiety, impaired attention, depression, somatization disorders and growth retardation at long-term [3].

Mean platelet volume (MPV) is a parameter as part of routine complete blood count tests which is usually overlooked by clinicians and it is one of the most widely used surrogate markers of platelet function [4, 5].

MPV is a parameter used as a platelet activation marker. MPV that is related to function and activation of platelets has been used as a marker of atherosclerosis. Various studies have suggested that there is an increased risk for atherosclerosis cardiac diseases in patients with adult form of obstructive sleep apnea [6-8]. There is limited numbers of studies which found that MPV values, considered as a marker of atherosclerosis, were elevated in adult patients with obstructive sleep apnea (OSA) [9].

Hence I present study we tried to evaluate MPV in patients with ATH and its relation with gender and age.

2. Materials and Methods

Fifty patients who underwent adenoidectomy or adenotonsillectomy with a diagnosis of adenoid hypertrophy (AH) and/or chronic tonsillitis between March, 2015 and august, 2016 in Department of Otorhinolaryngology & Head and Neck Surgery at Gandhi Medical College and Hamidia Hospital, were studied.

Age-matched 50 controls without symptoms of upper respiratory tract obstruction, systemic disease, acute/chronic infection or disease presented to outpatient clinics of Otolaryngology were also reviewed. Patients included in this study were assessed in two groups. Case group (n=50) consisted of patients who underwent adenotonsillectom and healthy children comprised control group (n=50).

Patients with adenoid hypertrophy and tonsillar hypertrophy,

complaining of snoring, mouth breathing, sleep apnea, recurrent pharyngitis, hearing loss and otitis media due to tonsillar and adenoid hypertrophy and patients not responding to conservative management are subjected to tonsilo adenoid resection were included whereas children of age <2 years for adenoidectomy, of age <4years for tonsillectomy and nasal obstruction due to deviated nasal septum, nasal polyp, inverted papiloma, other nasal mass, malignancy of tons, diabetes mellitus, any Bleeding diathesis and history of NSAID and steroid use were excluded from the present study.

In all patients detailed clinical history with special reference to snoring, nasal, nasopharyngeal and oropharyngeal problems were recorded. Study cohort was subjected to thorough ENT examination with special emphasis on anterior rhinoscopy, posterior rhinoscopy, oropharynx examination and ear examination. Further confirmation with rigid nasal endoscopy & fiber optic flexible endoscopy (FOFE) was done.

Venous blood samples were taken into tubes containing EDTA. Mindray sysmex BC-3600 3part auto hematology analyzer was used for mean platelet volume in the central pathology laboratory of Gandhi Medical College and Hamidia Hospital. Mean platelet volume (MPV) were individually assessed.

This study complied with the Declaration of Helsinki and was approved by the Ethical Committee and the institutional review board. Informed consent was taken from all caregivers. SPSS for Windows version 20.0 (Statistical Package for Social Sciences) were used for statistical analysis. Numeric data obtained by measurement were expressed as arithmetic average and standard deviation, while categorical data obtained with counting as number and percentage. One-way ANOVA and non-parametric Kruskall- Wallis test were used. Data found to be significant in Pearson correlation test among continuous variables and correlation test were analyzed in multivariate linear regression model. P<0.05 was considered as significant for all statistical data.

3. Results

Age of study cohort ranged from the 2 to 45 years. Most of the cases belong to the age group of 6-10 years (38%) followed by 24% patients who belong to age group of 11-15 years.

Majority of the patients were males [56% vs. 54% in cases and control respectively] in both the groups followed by females [44% vs. 46% in cases and control respectively].

MPV was significantly higher among cases (11.26±1.12) as compared to control group (7.74±0.59) (p=0.032). Among cases mean MPV (11.59±0.63) was highest among patients belonging to age group of 2-10 years.

MPV among males and females in case cohort was 10.72±1.23 and 10.86±1.14 respectively whereas MPV among female and male of control group was 7.76±0.52 and 7.73±0.49 respectively. No significant difference between MPV of males and females within cases and controls cohort was obtained. MPV of healthy subjects was 7.74±0.59 which range from 6.90 to 9.00.

Table 1: Showing Comparison of MPV among Male and Female

Gender	Cohort	N	Mean MPV	P value
Female	Case	22	10.72±1.23	0.012
	Control	23	7.76±0.52	
Male	Case	28	10.86±1.14	0.008
	Control	27	7.73±0.49	

4. Discussion

Adenotonsillar hypertrophy is one of the common causes of upper airway obstruction in 2-12 years of children. Research has shown adenotonsillar hypertrophy as the etiology of hypoxia. In addition adenotonsillar hypertrophy may also cause many pulmonary and cardiovascular complications beside poorer quality of life [2, 10].

In present study majority of the patients were in the age group of 6-10 years. In agreement to preset study Derin *et al*. studied 65 patients and found that majority of the patients lie in the age group of 5-10 years [11]. In another study by Ozkan *et al*. the most common age group was 5-10 years which is in agreement to present study findings [12]. Our study showed that adenotonsillar hypertrophy is still a disease of younger age group (6-10 years).

In present study, majority of the patients were males in both the groups. Study done by Derin *et al*. [11] are hand in hand with the findings of present study, however contrary to present study findings Ozkan *et al*. reported female predominance [12]. Based on present study findings we conclude that adenotonsillar hypertrophy is a male predominant entity which is opposed by the previous study done by Ozkan *et al*.

In present study, MPV was significantly high among case as compared to control group (p=0.032). Among cases mean MPV (11.59±0.63) was highest among patients belonging to age group of 2-10 years. Mean MPV among case and control group was 11.26±1.12 and 7.74±0.59 (p=0.032) respectively. Ulu *et al*. performed a similar study to evaluate the relationship between MPV levels and adenotonsillar hypertrophy and reported that MPV and platelet distribution width (PDW) levels of the patients with adenotonsillar hypertrophy were significantly higher than the control group (p<0,001), (p<0,001) respectively [13]. In contrast, Çevik *et al*. suggested that MPV values in children with AH were significantly lower than those in control subjects [14]. The inverse correlation between MPV and PLT has been described as tendency to maintain hemostasis by preserving a constant platelet mass [4].

Mean MPV values of adenotonsillar hypertrophy patients and Control group was 9.3±0.7 fl and 8.6±0.4fl respectively. In agreement o that Ulu *et al*. reported that MPV in patients with adenotonsillar hypertrophy were significantly higher than the control group (p<0.001) [13]. Ozkan *et al*. studied 95 children with adenoid hypertrophy for MPV values in children with adenoid hypertrophy and reported that MPV levels were 9.39 f L in patients with AH and 9.64 f L in the control group, but it was not statistically significant (p = 0.156) [12]. This shows that MPV is significantly higher among the cases as compared to the control group. Our findings are consistent with the

findings of the Ulu *et al*. and Ozkan *et al*. Onder *et al*. [15] found no significant relation between MPV and obstructive adenoid hypertrophy while recently Soyaliç *et al*. reported higher MPV in children with obstructive adenotonsillar hypertrophy when compared to healthy children [16].
In present study, we did not find any gender related MPV difference within the group. However, MPV of females of case and control was significantly different (10.72±1.23 vs. 7.76±0.52 respectively) (p=0.012). Among males also MPV was significantly different among case and control groups (10.86±1.14 vs. 7.73±0.49 respectively) (0.008). In agreement to present study findings study done by Au *et al*, Marcus *et al*. and Carra *et al*. had reported similar findings [17-19].
Cross sectional nature and sample size are the main limitation of present study. A large randomized clinical trial is required to strengthen the present study findings.

5. Conclusion

Children with persisting obstruction may lead to aggressive behavior, anxiety, impaired attention, depression, somatization disorders and growth retardation at long-term. The decision of operation should be given more quickly in children with ATH to prevent complications.
MPV was significantly higher among cases as compared to control group. Among cases MPV was highest among patients belonging to age group of 2-10 years. No significant difference between MPV of males and females within cases and controls cohort was obtained. Among females, MPV was significantly higher in cases as compared to Control, similarly males in case group had significantly higher MPV as compared to control.

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