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Original article

Correlation of mean platelet volume levels with severity of chronic urticaria

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Abstract

Background: Chronic urticaria (CU) is a multifactorial disease, however, in a majority of patients, it is not possible to ascribe a specific aetiology, which is termed 'idiopathic'. Although autoimmunity has been implicated as a principal cause in 30–50% of these idiopathic cases, activation of coagulatory and inflammatory cascades has gained attention in last few years.

Aims: To evaluate levels of mean platelet volume, an indicator of platelet activity, in patients with chronic urticaria and determine its correlation with its severity.

Methods: Mean platelet volume levels were assessed in 194 patients with chronic urticaria and were compared with equal number of age and sex matched controls. Its levels were also correlated with the severity of urticaria and results of autologous serum skin test.

Result: Mean platelet volume (MPV) levels were found to be higher in patients with ASST positive chronic urticaria compared to patients with ASST negative chronic urticaria and controls. MPV levels also showed a positive correlation with the severity of chronic urticaria.

Conclusion: As platelets secrete and express a number of crucial mediators of coagulation and inflammation, coagulation and inflammatory cascades may play a positive role in chronic urticaria, paving the way for better understanding of pathogenesis and introduction of newer drugs.

Keywords: Autologous serum skin test; Chronic urticaria; Mean platelet volume

1. Introduction

The term urticaria is used to dene a disease characterised by short-lived itchy weals, angio-oedema or both together (Grattan CEH and Humphreys F on behalf of the British Association of Dermatologists Therapy Guidelines and Audit Subcommittee, 2007). When urticaria is present daily or almost daily for more than 6 weeks, it is called chronic (Grattan and Kobza Black, 2010).

The causative factor is difficult to identify in chronic urticaria. When there is no detectable cause, it is known as chronic idiopathic urticaria (Champion et al., 1969). Autoimmunity has been implicated as a principal cause of chronic urticaria, potentially explaining 30–50% of previously idiopathic cases (Asero et al., 2001). A number of other factors have been implicated including drugs (Grattan, 2003), foods and food additives (Atkins, 1991), contactants (Williams et al., 2008), infections (Masood and Imran, 2008; Tebbe et al., 1996; Varda et al., 1983; Kanazawa et al., 1998; Serrano, 1975), infestations by intestinal parasites (Chirila

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et al., 1981; Walfrom et al., 1995), physical stimuli (Illig, 1973; Kobza Black, 1985; Champion, 1988) psychological factors (Koblenzer, 1983) and other autoimmune diseases. A highly significant linkage of HLA DRB1*04 (DR4) and its associated allele DQB1*0303 (DR8) with histamine releasing autoantibody has also been found in chronic urticaria (O'Donnel et al., 1999).

Urticaria occurs due to a local increase in permeability of capillaries and venules. These changes are dependent on activation of cutaneous mast cells in nearly all types of urticaria (Grattan et al., 1997). In autoimmune chronic urticaria, the participation of various pathogenic autoantibodies, has been postulated, targetting epitopes on IgE protein itself or α-chain of its high affinity FcεRI receptor, ultimately causing the release of histamine from mast cells (Fiebiger et al., 1995). Autologous serum skin test (ASST) is the only practicable test available to the clinicians to detect autoimmune urticaria. Confirmation is needed by in vitro testing for anti-IgE or FcεRIα autoantibodies (Greaves, 2000).

Recent studies demonstrated that activation of a coagulation cascade resulting in thrombin production (Asero et al., 2007) is a prominent feature of exacerbation of chronic urticaria. Within the coagulation cascade thrombin is a serine protease that induces activation of platelets and may play a key role in chronic urticaria (Lundbland and White, 2005).

Platelets secrete and express a large number of substances that are crucial mediators of coagulation, inflammation, thrombosis and atherosclerosis. Mean platelet volume (MPV) is the most commonly used measure of platelet size and is a potential marker of platelet reactivity (Coppinger et al., 2004; Gawaz et al., 2005). Studies indicate platelet volume is in direct correlation with platelet function because large platelets are more reactive. Large platelets are denser, and produce more thromboxane B_2 per unit volume of platelet cytoplasm (Martin et al., 1983). Several studies report a correlation between high MPV values and increased disease activity and inflammatory markers (Milovanovic et al., 2004; Canpolat et al., 2010; Yazici et al., 2010; Purnak et al., 2011).

2. Materials and methods

This study was a prospective, hospital based, case controlled study conducted on 194 patients of chronic urticaria attending the outpatient block of the postgraduate department of Dermatology, in our hospital.

An informed consent, basic demographic information and complete history were taken from each patient.

Clinical evaluation of the severity of chronic urticaria was done in each patient. Severity of chronic urticaria was calculated from the sum of individual scores (Bajaj et al., 2008) (Table 1).

An equal number of age and sex matched controls, attending the Dermatology OPD for insignificant complaints unrelated to chronic urticaria was taken. Chronic medical disorders such as diabetes mellitus, hypertension, autoimmune diseases, liver diseases, malignancies and intake of medication for the last 3 months were excluded in history.

All cases and controls underwent a general physical examination, systemic examination, mucocutaneous examination and complete blood count with mean platelet volume in femtolitres (fl) using an automated blood counter, from a venous sample collected at the time of presentation with urticarial lesions.

Autologous serum skin test was performed in cases only. It was performed with 0.05 ml of the patient's undiluted serum after blood centrifugation, which was injected intradermally into the volar aspect of the forearm together with a simultaneously injected equal volume of normal saline as control at an adjacent site. A red weal with a diameter of 1.5 mm greater than that at control site at 30 min was considered as positive.

2.1. Statistical analysis

Whole data were assimilated in the form of a master chart. Quantitative data were analysed by using a one way analysis of variance (ANOVA) and independent sample *t*-test. Categorical data were analysed by using the chi-square test. *p*-Value of <0.05 was considered significant. Data were subjected to statistical analysis using R-software.

3. Results

The age of the patients in the study group ranged from 8 to 70 yrs with a mean age of 30.07 yrs ± 3.55. Out of the total 194 patients 72 (37.11%) were males and 122 (62.88%) were females. Out of a total of 194 patients, 67 patients had a positive ASST, accounting for 34.53% of the total patients of

Table 1
Total urticaria severity score.

Score	0	1	2	3
No. of weals	None	≤10	11–50	>50
Size of weals	None	<1cm	1–3 cm	>3 cm
Intensity of pruritis	None	Mild	Moderate	Severe
Duration	None	<1 h	1–12 h	>12 h
Frequency of appearance	None	One in a week	2–3 times per week	Daily
Frequency of drug intake	None	Once in a week	2–3 times per week	Daily