

# A Preliminary Study of Histamine Level in Vitiligo Patients

\*Alokananda Chakraborty

Central Research Institute of  
Unani Medicine,  
A.G. Colony Road, Erragadda,  
Hyderabad 500 038

## Abstract

This preliminary study aims to add to the concept of stress participation in vitiliginous condition. For this, histamine level in the blood of vitiliginous patients was determined and the values were compared with that of the control. The results demonstrated that there occurs a significant increase in histamine level in patients whose vitiliginous lesions have just started.

**Keywords:** Vitiligo, Histamine, Stress.

## Introduction

Though histamine is a natural constituent of the body, it is liberated from the cells of the skin by noxious stimuli including antigen-antibody reaction. Mast cells that liberate the histamine are present in the connective tissue throughout the body except the brain. They contain specialized Lysosomal granules which are composed of complex macro molecules of many biologically active substances formed by intra cellular synthesis (Altire, 1978; Elenkov and Chrusos, 2006). In antigen induced hypersensitivity reaction, the mast cells function as the effectors cell armed with an arsenal of mediators and with the ability to synthesize additional biological agents, which when released in response to the appropriate stimulus induce dramatic change in surrounding target tissues (Wasserman, 1979). Actually, mast cell degranulation may have generalized damaging consequences. Panja (1985) has assumed it previously that hypersensitive condition in the body prevails during conditions of amelanosis. As an immunologic basis of vitiligo persists, it was therefore of our interest, to compare the histamine level in the blood of vitiliginous patients with normal subjects to find whether there is any relationship between histamine secretion under vitiliginous conditions, in different human subjects.

## Methodology

The study was conducted at the department of Dermatology, Calcutta Medical College & Hospital, Calcutta in the OPD of Prof. R.K. Panja during 16.12.1983 to 15.12.1988. Human subjects were divided into three groups of 30 subjects each. Patients suffering from vitiligo were included in test group while normal subjects were allocated to control group. Thus group I served as control group while group II & III served as test groups. Group II included the patients with early symptoms of vitiligo and the group III included the cases with extensive symptoms of vitiligo. The values were analyzed statistically using the Student's

\*Author for correspondence

t' test. Care was taken that no subject is having any other systemic disease. Blood samples were collected from the two groups and the histamine level was determined. The findings of the two groups were compared with each other to find the difference, if any.

#### Extraction of histamine from blood

5 ml of blood was added directly to 10 ml of 10% Trichloroacetic acid. The mixture was shaken vigorously during and after the addition. The precipitate of blood was separated in a filtering flask under suction. The precipitate was washed 2-3 times with 10 ml of 5% trichloroacetic acid. Concentrated hydrochloric acid in ratios of 5 ml blood was added directly to the trichloroacetic acid filtrate. Then the extracts were boiled for 90 minutes over a flame on a sand – bath being careful to avoid charring. The volume of the extracts were maintained during boiling with acid by use of a reflux condenser and then heated to dryness in vacuum over a hot water bath maintained at 70°C. Final extracts were then prepared with distilled water.

#### Procedure for determination of histamine

It was determined by the method of Shore (1971). To a 2 ml aliquot of histamine solution in a small test tube, 0.4 ml 1N NaOH was added, followed by further addition of 0.1 ml of Ortho-thaldehyde reagent, after 4 min at room temperature. 0.2 ml of 3N hydrochloric acid was added. The tubes were shaken after each addition. Preparation of a standard curve of histamine was performed by the same way. The solutions were transferred to fluometer cuvetts and the fluorescence were determined at 450 nm in a Perkin-Elmer Fluorescence spectrophotometer at Regional Sophisticated Instrumentation Centre (RSIC), Bose Institute, Calcutta.

#### Observations and Result

The histamine concentration of vitiligo patients with extensive symptoms did not reveal any significant difference as compared to the control value.

The histamine contents of vitiligo patients with early symptoms of depigmentation showed significant increase in the histamine concentration when compared with group I and II.

#### Discussion

From the table 1, it appears that histamine level in blood are elevated in vitiligo patients where depigmentation is in a preliminary stage. It is well known that

**Table 1:** Determination of histamine level in the blood of patient's suffering from vitiligo along with controls

Subjects	Mean $\pm$ SE ng of Histamine/ml of blood
Control (Male only) (30)	63.50 $\pm$ 2.3 A
Patient's with early symptoms of Vitiligo (Male only) (30)	80.27 $\pm$ 5.4* B
Patient's with extensive Vitiligo (Male only) (30)	56.87 $\pm$ 3.3** C

n=30

\* p < 0.02 (A vs B)

\*\* p < 0.001 (B vs C)

under stress condition histamine secretion is increased (Nordlund *et al.*, 1982; Nakano and Suzuki, 1984; Boisseau, 1998). At the onset of disease stress factor may be of sufficient magnitude to stimulate the histamine release which after sometimes may reach a steady state condition when the vitiliginous condition is stabilized and the rate of increase of histamine release is decreased to a greater extent or slowed down. So, the increase of histamine activity lends further support to our idea that stress might be concomitant with depigmentation process. Further it has been elucidated by Srivastava and Jaju (1987) that exogenous administration of histamine activates histaminergic receptor in the hypothalamus which causes release of dopamine in pars intermedia and thereby inhibits Melanocyte Stimulating Hormone (MSH) release, thereby inhibiting pigmentation. But, the value of MSH on pigment dispersion in human subjects has been questioned. It is also known that imidazole ring can accelerate the tyrosine aminotransferase activity. As histamine is built on imidazole fragment, so from structural consideration it is plausible that histamine may increase aminotransferase activity making facile conditions for the onset of vitiligo. Further hypersensitivity reactions during the depigmentation process may also cause production of lymphokines thereby inhibiting pigment formation. Further investigations are necessary, as other substances which have cytotoxic effects should be analyzed to reach a definite conclusion (Arck *et al.*, 2006). Histamine appears to play a significant role in the pathogenesis of vitiligo characterized by faint hypopigmented patches with significant itching (Panja *et al.*, 2013).

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