INTRODUCTION

Pyrethroids are the most commonly used compounds in India and other countries to get protection from mosquitoes, insects and pests for household and agricultural purposes due to their high insecticidal activity\textsuperscript{1-5}. Allethrin and prallethrin are among the widely used pyrethroids in India and especially in peninsular India as prevalence of mosquitoes and other insects is high\textsuperscript{6,7}. Pyrethroid-induced neurotoxicity and other toxic (acute and chronic) symptoms, their other deleterious effects on humans and experimental animals in recent reports aroused a concern among public regarding their chronic use\textsuperscript{8-11}.

Inhalation is the route of exposure in humans continuously for 8-12 hours a day by which these compounds enter into circulation in humans with their maximal accumulation in all biomembranes and in specific tissues such as blood, nervous, adipose and other tissues with an increased uptake due to their lipophilic nature\textsuperscript{1,12,13}. As inhaled pyrethroids directly enter the circulation and different tissues rapidly, further distribution of these inhaled pyrethroids to different tissues cause effective damage\textsuperscript{14-16}. Plasma, RBCs, and other blood cells, and vascular system are exposed to the continuous presence of these pyrethroids and their subsequent degradatory products formed as a result of their metabolism are highly toxic than the original compounds for longer durations and for prolonged periods thereby exerting potential toxic effects by influencing electro physiological and biochemical processes in a large scale\textsuperscript{17}. These agents are poisonous and can affect the nervous system causing symptoms that range from whole body tremors to convulsions that some times result in death\textsuperscript{12,18,19}. Usually, pyrethroids are used at levels that may not lead to acute
poisoning, but these lower levels may stimulate chronic effect when exposure is prolonged and/or recurrent\(^1,20\). Evidences suggest that biological membranes are the main targets, if not, at least largely responsible for pyrethroid toxicity and the potential molecular targets for pyrethroids are various membrane components viz., voltage gated sodium channels, calcium and chloride channels, ATPases, GABA receptors, glutamate receptors, acetylcholine receptors, membrane phospholipids etc.,\(^8,21-23\). Besides activating voltage dependent sodium channels, chiefly type-I pyrethroids stimulate phosphoinositide (IP\(_3\)) breakdown by a different mechanism not involving sodium channels\(^24\). However, the precise mechanism(s) by which these pyrethroids exert toxicity in humans is partially understood. Since much of the available literature is related to acute studies, and, as there is no data on chronic effects, recent reports repeatedly emphasized a need for generation of data on chronic effects of certain pyrethroids that are used routinely\(^25-27\). Hence the present study is designed with a view to understand the effects of two pyrethroids allethrin and prallethrin on their prolonged and routine use by humans. This study is targeted in evaluating the effects induced in humans by the chronic use of allethrin and prallethrin, and in understanding the interactions of these pyrethroids with membrane components and processes. Hence the present study is aimed at the following objectives, in particular,

- to evaluate the effects of the two pyrethroids allethrin and prallethrin on plasma glucose homeostasis, plasma lipid profile and some other important components of plasma.
• to investigate the effects of these pyrethroids on certain key components of RBC membrane, membrane physico-chemical properties and to see the intactness/structural and functional integration and tolerance of the membrane.

• to investigate the role and involvement of nitric oxide in the pyrethroid-induced effects, if any.


