INTRODUCTION
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Cigarette smoking is a reprehensible habit that has spread all over the world. Considerable research attests the adverse effects of chronic smoking on human health. Smoking has been implicated in the development of many cardiovascular, pulmonary and ocular diseases, and also neurological disorders\textsuperscript{1,2,3,4}. The mechanism of these adverse effects appears to include oxidative damage to essential parts of body by the oxidants present in cigarette smoke itself and by the oxidants generated by cigarette smoke - induced activation of endogenous cells such as macrophages\textsuperscript{5,6}. Though the developed world largely recognized the devastating effects of chronic cigarette smoking on pulmonary, cardiac and vascular function leading to various forms of cancer, people are unable to quit smoking\textsuperscript{7}.

Cigarette consumption has risen over the past two decades in India and most other countries. Reports reveal that the smoking rate is on continuous increase\textsuperscript{8}. World estimates suggest that if the current pattern of smoking continues, this 21\textsuperscript{st} century is about to see 1 billion tobacco deaths\textsuperscript{8}. There would not have been the problem of tobacco deaths, had it been possible to control smoking by the aggressive campaigns and efforts made by various recognized bodies, governments and WHO\textsuperscript{9,10}. The authentic stimulatory, euphoric, reinforcing and addictive properties of cigarette smoking make people not to quit the habit. Besides, some other useful effects such as mood control, weight control and relief of tobacco withdrawal symptoms, may slightly improve performance and health of people to cope with daily stress\textsuperscript{11}. Further, unlike
other drugs, anesthetics and alcohol cigarette smoke does not impair performance in judgment, cognition and motor behavior\textsuperscript{11}.

What ever may be the reason, every year new smokers are added to the catalogue with the entry of new smokers day by day, including teenaged boys and girls and thereby increasing the number of world’s smokers\textsuperscript{7}.

Under these circumstances, it is relevant to study the physiological and other changes caused by cigarette smoking in the individuals to find out therapeutic approaches for smoking associated disorders and also possibly help in drug design for the same or even to cure patients with related cardiovascular/pulmonary/neurological diseases and mitigating the use of cigarettes appreciably\textsuperscript{2,4}. Moreover, such studies also would generate basic information related to tobacco/nicotine addiction tolerance and also adaptation processes induced by cigarette smoking\textsuperscript{12}.

With the advancement of science and updated knowledge, various techniques, concepts and approaches have emerged to understand the mechanisms and processes. A puff of cigarette smoke introduces $10^{18}$ free radicals, some chief constituents such as nicotine, NOx, aldehydes, peroxides, benzene, epoxides etc., into human body\textsuperscript{13,14,15}. Though some earlier research was designed on nicotine to assess the effects of cigarette smoke, it is now clear with the present knowledge that the effects of nicotine are not equivalent to cigarette smoke due to its heterogeneous composition and variable effects\textsuperscript{16,17,18}. Though nicotine, a chief constituent of tobacco is considered to be responsible for cigarette smoking addiction, recent reports reveal the direct
involvement of nitric oxide in cigarette smoking addiction\textsuperscript{12}. Besides, limited literature is available on biochemical and pathophysiological events related to smoking\textsuperscript{18}. The precise biochemical events at molecular level related to cigarette smoking are not clearly understood in human\textsuperscript{18}. Recently, the active involvement of nitric oxide in cigarette smoke - mediated physiological and pathological events is evident\textsuperscript{19,20}. However, its precise interactions and mechanisms are not clear\textsuperscript{18}. In general, various psychoactive substances and stimulants exert their actions primarily by perturbing cell membrane (lipid bilayer) and thereby bringing about physicochemical alterations in biomembranes and then signal transduction\textsuperscript{21}. No such information concerning cigarette smoking or events are known so far\textsuperscript{18}. As humans are oronasal inhalers, the inhaled smoke effects not only pulmonary parts but also parts of digestive tract, then enters circulation affecting cardiovascular system and then, all parts of the body through blood supply\textsuperscript{22,23}. Plasma and red cells are frequently exposed for long time to cigarette smoke constituents for prolonged periods in smokers as smoking is a continuous puff after puff exercise\textsuperscript{22}. Since blood plays an important role in the integration of metabolism, and in supplying oxygen, nutrients etc., blood also act as a reservoir of wastes, metabolites, carriers etc\textsuperscript{24}. Blood analysis provides essential information regarding various physiological and biochemical processes\textsuperscript{25}. Moreover, blood sampling is easier, accessible and red cell membrane has been serving since a long time as a convenient and the best model for various studies on biomembranes\textsuperscript{26}. As membranes are known target sites of action for various psychoactive drugs and other chemicals, the cigarette smoke with its heterogeneous composition of two phases, - the gas and
particulate, the resultant membrane – cigarette smoke interactions appear to be complex and are yet to be understood\textsuperscript{14,27,28}.

There is a paucity of information concerning the mechanisms of various biochemical events related to cigarette smoking.

Hence the present study is designed to understand the precise biochemical events associated with cigarette smoking at molecular level in blood plasma and biomembranes (red cell membrane) that are responsible for cigarette smoking induced changes in humans associated with biochemical, physiological and pathological processes. As little information is available on the role of nitric oxide in cigarette smoking mediated processes, an attempt has been made to evaluate the role and status of nitric oxide in cigarette smoking mediated effects.


