

## Prospects of Adaptogens Mediated Intra-Nasal Delivery System in the Treatment of High Altitude Induces Stress

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High altitude-induced hypobaric hypoxia (HA-HX) results in pulmonary edema, stroke, cardiovascular dysfunction, and even death in ascendants and sojourners due to hypobaric hypoxia [1,2]. Despite HA-HX induced stresses are major threat especially to military personal; the development of a suitable therapy is still underway. Importantly, this may be attributed to the poorly understood pathophysiology of HA-HX induced stress. Moreover, information on the ideal drug candidate either from synthetic or natural sources are sketchy. Off late, the prospects of adaptogen in the treatment of high altitude induces stress have been highlighted in few literatures [3-7]. Adaptogens are the plant-derived biologically active substances that appear to induce a state of nonspecific increase of resistance of the organism towards assaults that threaten internal homeostasis and improve physical endurance [8]. They possess a unique capability to increase the body's natural resistance and adaptation to adverse environmental conditions that may lead to oxidative stress. This stress at high altitude leads to a variety of illnesses like acute mountain sickness (AMS), high-altitude pulmonary edema (HAPE), and high-altitude cerebral edema (HACE) [9]. It was long been hypothesized that plants growing at high-altitude, possess exceptional features that help them to grow there [3]. Further, adaptogens are believed to contribute to the adaptability of inhabitant of high-altitude owing to their inclusion in regular diet. Considering these characteristics, adaptogens could be used for the acclimatization of soldiers and to enhance their combat-readiness at high-altitude. However, implication of new and efficient technological approaches is essential for their administration.

In recent years, intranasal drug delivery for systemic medication has attracted much attention as a promising alternative administration route [10]. Nasal delivery systems have been reported to improve oral absorption, bioavailability, and therapeutic efficacy of drugs [11]. Interestingly, nasal route offers a non-invasive and practical alternative route of administration for bypassing gastrointestinal and hepatic first-pass effects and ensuring direct transportation into the systemic circulation and rapid onset of action [12].

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