

Interaction studies of active ingredients of *Withania somnifera* (Ashwagandha) with Beta-1 adrenergic receptor: A target for Cardiovascular Disease

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Cardiovascular Diseases (CVD) remain one of the leading causes of deaths despite several advancements in the medical interventions. The synthetic drugs that constitute the current pharmacological armamentarium are themselves effective in managing the condition by targeting different receptor proteins but not without setbacks. For cardiovascular diseases, herbal treatments have been used in patients with congestive heart failure, systolic hypertension, angina pectoris, atherosclerosis, cerebral insufficiency, venous insufficiency, and arrhythmia. However, many herbal remedies used today have not undergone careful scientific assessment. With the high prevalence of herbal use in the United States/India today, clinicians must inquire about such health practices for cardiac disease and be informed about the potential for benefit and harm. Continuing research is necessary to elucidate the pharmacological activities of

the many herbal remedies which are now being used to treat cardiovascular diseases. Around 80 different validated protein/receptor targets have been identified for CVD's which are associated with different pathways like Calcium signaling pathway, Arachidonic acid metabolism and Metabolic pathways etc. Beta-1 adrenergic receptor is one of the promising targets for cardiovascular disease. Many available drugs are targeting this receptor molecule, example: Acebutolol; Sotalol; Practolol; Levobetaxolol. But those are having some adverse side-effects. So we need molecule with fewer side effects. It has been experimentally established that *Withania somnifera* is beneficial for the heart, but the exact molecular mechanism is not known. The Docking studies revealed that Withaferin-A binds to the active site of Beta-1 adrenergic receptor with significant affinity and its interaction energy is better than Levobetaxolol