

# The Duality of Propranolol as an Anxiolytic and Anti-hypertensive

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## Abstract

Propranolol founded in 1964 is an increasingly safe and effective drug listed on the WHO list of Essential Medicines. Initially used solely as an antihypertensive medication, Propranolol has other applicable uses particularly as an anxiolytic. Our patient is a 21-year-old college student who was suffering from social anxiety and hypertension ranging in the 150/90s. Patient had trouble speaking in public from group meetings. He had symptoms of insomnia, hyperhidrosis and palpitations before these appearances. After years of not seeking treatment, the patient finally sought medical care in his senior year. The University psychiatrist prescribed propranolol that brought efficient relief for the patient's social anxiety and helped lower his blood pressure to a therapeutic range.

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## Background

Social anxiety, also called social phobia is intense anxiety or fear of being judged, negatively evaluated, or rejected in a social or performance situation. This can occur in various aspects of life affecting people in different ways. From academia to music performance, social performance anxiety can lead to symptoms of depression, anxiety, and increased isolation. According to ADAA, social anxiety disorder affects 15 million American adults. It can also lead to unhealthy lifestyle choices that result in deleterious medical consequences as will be noted in our patient. Propranolol not only helped ease social anxiety but also as a consequence lowered our patient's blood pressure hence show casing its duality as a treatment modality.

## Case Presentation

The patient had a history of moderate to severe social anxiety which was aggravated during college life. He was raised in an isolated environment in Pakistan and moving to America at 18 year resulted in the patient experiencing a culture shock. Also, feeling lonely and having only experienced the fast food phenomenon, the patient relied heavily on an unhealthy sedentary lifestyle. This led to a weight gain from 170lbs pre-college to 230lbs by the start of his senior year. This contributed to a diagnosis of hypertension by junior year with a baseline bp of 150/90. The patient was advised to live a healthier lifestyle and develop better eating habits with exercising but he was non-compliant and did not schedule any follow up appointments. His senior year involved classes that required group and public speaking engagements, something the patient had avoided until now. He experienced symptoms of glossophobia, palpitation, restlessness, excessive sweating and insomnia thinking about the assignments. Patient would miss classes due to this and this led to the possibility of not graduating. The thought of failing to graduate led the patient to seek medical help. After being advised to develop a healthier lifestyle, the patient was prescribed propranolol to treat his elevated blood pressure as well as his performance anxiety. The patient was instructed to take Propranolol 30-45mins before his presentations.

## Past Medical History: Hypertension

Past Family History: The patient's father and mother both have a history of hypertension. The patient's mother also has a history of anxiety.

Past Social History: Pt denies use of alcohol, nicotine and illegal drugs.

## Differential Diagnosis

1. Social Anxiety
2. Major Depression Disorder
3. Generalized Anxiety Disorder
4. Panic Disorder
5. Primary Hypertension
6. Secondary Hypertension

## Treatment

40 mg Propranolol BID and Lorazepam PRN were prescribed for the patient. The patient was advised to take the medications 30-45 mins before public speaking engagements and propranolol in the evening around 7pm for controlling any night time palpitations and aid with his hypertension. The patient successfully completed a course of 4 months leading up to winter break at which point he continued with his propranolol treatment. After reevaluating the patient after his break and observing marked improvement the medications were continued till the end of his spring semester. A follow up appointment was scheduled post-graduation where the patient was advised to consult a therapist for development of coping mechanisms to deal with his social anxiety and tapered off his propranolol over a month period and asked to follow up with his home town PCP.

## Outcome and Follow Up

Patient reported marked improvement in his public speaking engagements and social anxiety. Patient's blood pressure reduced from a pre-treatment reading of 150/95 to a post-treatment reading of 125/80. Patient was advised to follow up with this PCP regarding

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his blood pressure management post-graduation and seek therapeutic help for the development of skills training to manage his social anxiety going forward as well as to maintain healthy lifestyle choices and exercise. The patient was appreciative for the help and assured regarding compliance to his therapeutic regime in the future.

The medication helped reduce the symptoms for the patient. He reported that the heart palpitations were significantly reduced, and sweating was reduced. The medication also helped the patient remain relatively calm during public speaking, and anxiety levels were reduced. When the doctor measured the patient's bp after he started taking the medication, it had reduced to 125/85. The medication resulted in swift and ameliorative effects allowing the patient to complete all his assignments, participate in group and public speaking engagements, and graduate on time over the course of the year.

## Discussion

Propranolol is indicated for essential hypertension treatment. Its mechanism of action in lower blood pressure is multi-dimensional involving cardiac output decrease, renin release suppression, vascular relaxation, inhibition of the sympathetic tone and presynaptic B-receptors. More recent research has focused on propranolol decreasing adrenal tyrosine hydroxylase by reducing catecholamine synthesis leading to less amount of amine release resulting in smooth muscle relaxation and hence a resultant decrease in blood pressure [1].

Studies suggest that anxiety is sustained by peripheral afferent autonomic biofeedback which is the pathway inhibited by b-adrenergic blockade by propranolol [2]. B-adrenergic blockade in the central nervous system takes serotonin into account in terms of its anxiety provoking effects [3]. Propranolol also acts centrally on the 5-HT serotonergic system inhibiting the postsynaptic central 5HT-mediated response while not altering dopamine regulation. Pierson and colleagues suggested that propranolol with its modest affinity for 5-HT receptors especially 5-HT<sub>1B</sub> agonism and 5-HT<sub>1A</sub> antagonism that can decrease anxiety. While results suggest that Beta-adrenoceptor blockers like propranolol may be helpful in treating anxiety, more extensive investigations are needed for a concrete mechanism of how these anxiolytic effects are induced [4]. Low dose 20-40mg dosage PRN is the standard treatment modality for someone suffering from social phobia who face challenges in performing daily activities whether it be public speaking or catering to any specific phobia [5].

## Competing Interests

The authors have declared that no competing interests exist.

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