A grass allergen challenge was performed before and after the intervention and nasal fluid collected with a sponge at 0, 5, 15, 30, 60, 120, 180, and 240 min.

Total nasal symptoms score (TNSS) and peak nasal inspiratory flow (PNIF) were recorded at same time points.

Cytokines by multiplex ELISA cytokine panel were collected at the same time points.

Forty seven participants were randomized to four groups:
1) nasal placebo + oral placebo (NP + OP) (N = 8)
2) nasal steroid + oral placebo (steroid + OP) (N = 9)
3) nasal placebo + broccoli sprout extract (NP + BSE) (N = 12)
4) nasal steroid + broccoli sprout extract (steroid + BSE) (N = 16)

Patients in congested cities may be more prone to suffer from allergies, due to the effect of pollution in allergic disorders. Our study determined if patients with allergic rhinitis could benefit from broccoli sprout extract (BSE) supplementation.

Methods
- A grass allergen challenge was performed before and after the intervention.
- Total nasal symptoms score (TNSS) and peak nasal inspiratory flow (PNIF) were recorded at same time points.
- Cytokines by multiplex ELISA cytokine panel were collected at the same time points.

Study Design
A randomized, double-blind, placebo-controlled trial was performed. Forty seven participants were randomized to four groups:

Results
There appeared to be clinical significance during various time points when comparing the intervention groups to placebo. Following the intervention, when comparing to placebo:
- PNIF showed statistical significance at 5 (p = 0.03), 15 (p = 0.02), 60 (p = 0.01), 180 (p = 0.04), and 240 (p = 0.04) minutes following nasal challenge in group 1, and statistical significance at 60 minutes in group 2 (p = 0.02) and 3 (p = 0.01)(figure 1a). The area under the curve was not significant.
- TNSS, when comparing group 1 vs. 4, there appears to be statistical significance at 5 (p = 0.03), 15 (p = 0.057, and 30 (p = 0.05) minutes following nasal challenge(figure 1c). When compared to the nasal saline/placebo BSE, TNSS scores among the 3 active groups improved following the 3 week intervention though the area under the curve was not significant.
- No differences in IL-1, IL-6, or IL-8 was seen among the 4 groups.
- Although mean differences in T2 cytokines were diminished cytokine levels following intervention. Although mean differences in T2 cytokines (IL-4, IL-5, IL-13) at various time points after challenge were lower for the steroid +BSE group compared to the nasal saline + placebo tablet, there was no statistical significance (P>0.05).

Conclusion
Daily BSE consumption in combination with daily nasal steroid application for 3 weeks further improved PNIF after grass allergen challenge compared to nasal steroid alone.

Discussion
- PNIF (area under the curve, AUC) increased in NP + BSE, steroid + OP, and steroid + BSE groups, with statistical significance in steroid + BSE group.
- TNSS (AUC) decreased in the NP + BSE, steroid + OP and steroid + BSE groups, but did not reach significance.
- Steroid + BSE treatment decreased T2 cytokines at various time points compared to NP + OP or steroid + OP though was not statistically significant.

Summary
- TNSS (AUC) decreased in the NP + BSE, steroid + OP and steroid + BSE groups, but did not reach significance.
- Steroid + BSE treatment decreased T2 cytokines at various time points compared to NP + OP or steroid + OP though was not statistically significant.