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The parasympathetic system in exercise-induced rhinorrhoea

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SUMMARY

The present study demonstrates that ipratropium bromide significantly reduces normal resting nasal secretion ($p < 0.05$) and also significantly reduces exercise induced rhinorrhoea compared with a placebo ($p < 0.01$). It also demonstrates that there may be another non-parasympathetic cause/or the increase in nasal secretion with exercise.

INTRODUCTION

Exercise rhinorrhoea has been described in both normal and asthmatic subjects (Stanford and Stanford, 1988; Stanford et al., 1988). The exact mechanism of its production is not known but at least on the motor side it is probable that parasympathetic stimulation is important. It has been demonstrated by Ostberg et al. (1987) that the watery discharge produced by exposure to cold air can be blocked by prior application of ipratropium bromide.

The present study was designed to see if ipratropium bromide could block the nasal secretion produced by exercise.

METHOD

Nine healthy males (age range 22-47 yrs) gave informed consent to take part in a double-blind, randomly allocated study on the effects of placebo and ipratropium bromjde upon exercise-induced rhinorrhoea. None of the subjects had nasal or bronchial disease and they were not receiving medication for other complaints. The study was passed by the Ethical Committee of the Queen's University, Belfast.

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Ipratropium bromide 80 μg per nostril or placebo (propellant gas) were given by metred dose inhaler. After a rest period of 10 minutes, the placebo or drug was applied. After another 20 minutes of rest, a 12-minute exercise period was started and this was followed by another 12 minutes of rest. Throughout the study, subjects were encouraged to mouth-breathe. The exercise consisted of free running in a corridor to maintain a pulse rate of 85%, predicted for age. The studies were carried out at the same time of day, within a one-week period. Nasal secretions were collected by blowing into pre-weighed tissues and placed in a sealed pre-weighed jar. The post-collection weights were measured within one hour. All secretions were collected at four-minute intervals during the exercise and recovery periods. The resting values prior to application of drug and prior to onset of exercise were collected four minutes after a nose blow which was discarded.

A two-way analysis of variance was performed to test for significant differences between the treatments. Dunnets' test was performed to test for differences at specific time points. The results are given as means (SEM) for weight (mg) of secretion. A significant difference was taken to be $p < 0.05$.

RESULTS

There was no statistical difference ($p > 0.05$) between the weight of resting secretion on the two studied drugs (Figure 1). Twenty minutes after the application

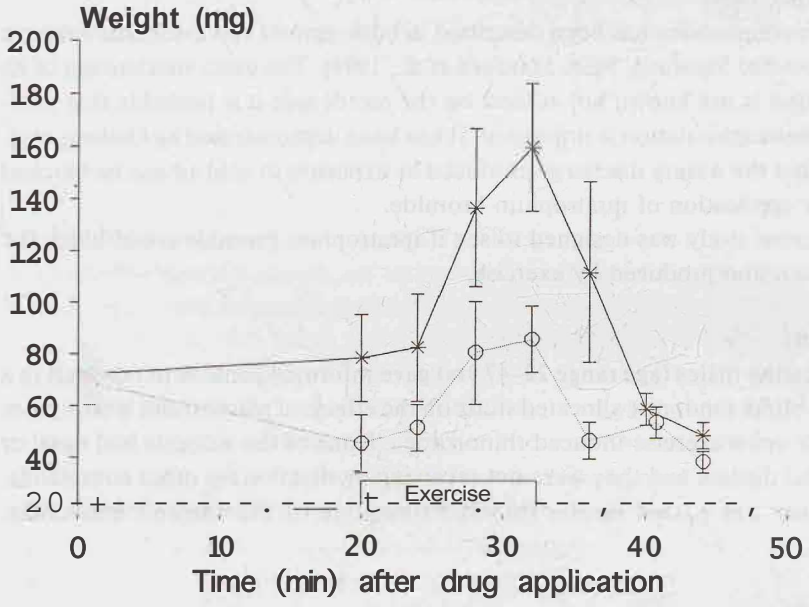

Figure 1. A comparison of the effect of ipratropium bromide (80 μg per nostril) with placebo upon resting and exercise-induced nasal secretion in nine normal individuals.

of ipratropium bromide, but not placebo, there was a significant reduction ($p < 0.05$) in the secretion weight. Exercise induced a significant increase in secretion with placebo ($p < 0.01$). Exercise also significantly increased the nasal secretion with ipratropium bromide compared with the pre-exercise time ($p < 0.05$) but not compared with the pre-drug time ($p > 0.05$). The maximum secretion at the end of exercise was significantly less with ipratropium bromide compared with placebo ($p < 0.01$).

DISCUSSION

The results demonstrate that ipratropium bromide in a dose of 80 μg per nostril significantly reduces resting nasal secretion and demonstrates that parasympathetic stimulation plays an integral part in its production. A previous study (Ostberg et al., 1987) using different methodology did not demonstrate this effect on resting nasal secretion.

The significant reduction in peak-exercise-induced rhinorrhoea by ipratropium bromide demonstrates that like cold-air-induced rhinorrhoea (Ostberg et al., 1987), parasympathetic stimulation plays a major role. The fact that the anticholinergic drug did not abolish the phenomenon may be due to incomplete blockage of sites due to too small a dose or to insufficient penetration. The dose to each nostril is, however, the equivalent to double that used as the standard anti-asthmatic dose of ipratropium bromide. Another possible explanation is that other autonomic or neurohumoral mechanisms are involved and this is being studied.

CONCLUSION

Exercise-induced rhinorrhoea is at least partly mediated on the motor side by the parasympathetic nervous system and can be inhibited by prior treatment with ipratropium bromide.

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