THE CLINICAL PHARMACOLOGY OF A HERBAL ASTHMA CIGARETTE

H.L. ELLIOTT & J.L. REID

Department of Materia Medica,
Stobhill General Hospital,
Glasgow, G21 3UW

- 1 Herbal preparations containing atropine-like alkaloids are marketed as proprietary asthma remedies, typically in the form of cigarettes.
- 2 This randomised, cross-over study compares in six healthy volunteers the pharmacological effects caused by smoking a standard, medium tar, tobacco cigarette or a herbal cigarette.
- 3 Smoking a herbal cigarette is associated with a significant fall in heart rate consistent with the systemic response to atropine-like alkaloids and a significant increase in peak expiratory flow rate consistent with the bronchodilator effect of reduced cholinergic activity.
- 4 Smoking a herbal cigarette seems analogous to the inhalation of ipratropium by aerosol for a local bronchodilator effect.

Introduction

In recent years there has been an increasing number of reports describing the abuse of herbal preparations formulated as traditional asthma remedies (Harrison & Morgan, 1976; Ballantyne, Lippiett & Park, 1976; Barnett, Jones & Williams, 1977; Bethel, 1978). Central stimulation and visual hallucinations are the sought-after effects of the ingestion of large amounts of these herbs which contain hyoscyamine and other atropine-like alkaloids. Such preparations, typically in the form of cigarettes, are readily available 'over-the-counter' and the understandable reaction of the medical profession generally has been that this availability should be revised with a view to withdrawal or at least reduced availability to the potential abuser.

An asthma treatment which requires to be smoked is superficially undesirable. Furthermore, although such preparations have been previously shown by Herxheimer (1959) to increase the vital capacity of patients with asthma, it is often assumed that they will not be pharmacologically beneficial, despite the anticholinergic properties of the constituent alkaloids which provide a theoretically rational basis for therapeutic efficacy.

In the last 6 months there have been at least three admissions to this hospital of children with severe anticholinergic poisoning following the ingestion of Potter's® asthma cigarettes (containing shredded stramonium leaves) bought 'over-the-counter' in retail pharmacies. The clinical features were identical to those described in the previous reports (Harrison & Morgan, 1976; Ballantyne *et al.*, 1976; Barnett *et al.*,

1977; Bethel, 1978). Our immediate reactions were to doubt whether such asthma remedies had any place in therapeutics and to dismiss them as potentially dangerous. However, the results of further study suggest that herbal cigarettes, when smoked, do indeed have anticholinergic effects which may benefit the asthmatic.

Methods

Six normal healthy volunteers (cigarette smokers), four males and two females aged 20–36 years were studied on 2 separate days after smoking a Potter's asthma cigarette or a medium tar tobacco cigarette. A double-blind design was not practicable because of the distinctively different tastes and smells of the two cigarettes but there was random allocation of cigarette type. Study days were 1 week apart and all subjects abstained from tobacco and caffeine-containing drinks for at least 6 h beforehand. Measurement was made at 15, 30, 60 and 120 min after smoking, of:

- (a) supine heart rate,
- (b) supine blood pressure, (both by Roche Arterisonde),
- (c) pupillary diameter,
- (d) salivary flow by the technique of weighed dental rolls as described by Dollery, Davies, Draffan, Dargie, Dean, Reid, Clare & Murray (1976) and
- (e) pulmonary function—peak expiratory flow rate (each recorded reading was the mean of three consecutive assessments of peak expiratory flow through a spirometer).

Results

Details of the mean effects on heart rate and pulmonary function are shown in Table 1, and the effects of salivary flow are shown in Figure 1.

Statistical evaluation was by Friedman's non-parametric two way analysis of variance, and by Student's paired *t*-test.

No significant changes were detected in pupillary diameter or supine blood pressure.

Figure 1 Changes from baseline measurement of salivary flow rate after smoking a tobacco cigarette (○) or an asthma cigarette (●) in each of the six subjects. The mean values ($\pm$ s.d.) are shown with statistical evaluation by Student's paired *t*-test. * $P < 0.05$, ** $P < 0.025$.

Heart rate

Smoking a herbal cigarette was associated with a fall in heart rate from baseline measurement compared to an increase in heart rate after the tobacco cigarette. This change in heart rate was most apparent at 15 min with a mean heart rate of 63 beats/min (Δ mean -6.3) following the asthma cigarette, compared to 81 beats/min (Δ mean $+9.5$) following the tobacco cigarette. These changes from baseline achieved statistical significance 15 and 30 min after smoking by both methods of analysis.

Salivary flow

The pattern of response in salivary flow showed a reduction following the asthma cigarette, with a mean salivary flow rate of 0.50 g/min at 60 min, compared to 0.95 g/min following the tobacco cigarette. Statistical analysis of the changes in salivary flow demonstrated significance by paired *t*-test at all times, but this was not confirmed by analysis of variance.

Peak expiratory flow rate (PEFR)

Compared to baseline measurements, mean increases of up to 40 l/min were associated with the asthma cigarette. For example, at 30 min after smoking the mean change in PEFR was $+41.2$ l/min following the asthma cigarette, compared to -0.2 l/min following the tobacco cigarette. Differences in the effects of the two cigarettes achieved statistical significance at all times by both methods of evaluation.

Discussion

Although an overdose of ingested asthma cigarettes is manifestly capable of producing pharmacological effects (hallucinations, delirium, tachycardia, mydriasis) (Harrison & Morgan, 1976; Ballantyne *et al.*, 1976; Barnett *et al.*, 1977; Bethel, 1978), we were sceptical of its recommended mode of usage (smoking) being of therapeutic benefit to an asthmatic. However, bronchial smooth muscle is under cholinergic influences, and bronchodilatation can be produced by anticholinergic drugs with the obvious therapeutic parallel in the use of ipratropium (Bleichert, 1975; Hamm, 1975). However, although an asthma cigarette contains approximately 0.6 mg atropine-equivalent alkaloids, it is a crude preparation and, after smoking, the amount of active drug reaching the bronchial tree must be extremely variable and unpredictable.

In contrast to the lack of side effects shown by the standard doses of inhaled ipratropium (Bleichert, 1975; Hamm, 1975), smoking an asthma cigarette produces systemic atropine-like effects in terms of reduced heart rate and diminished salivary flow. However, the total dose of alkaloid is greater and the different mode of administration may result in a greater systemic absorption of drug from the oropharynx. The most interesting finding was of small, but statistically significant, increases in peak expiratory flow. While this may reflect a placebo effect (it was impossible to disguise the taste and smell of an asthma cigarette) the significant and substantial reduction in saliva production provides corroborative evidence of anticholinergic activity.

Statistical evaluation of the results proved difficult because of the small number of subjects, and the apparent lack of a normal distribution. As no single statistical analysis seemed entirely appropriate, the results for both analysis of variance and paired *t*-tests are shown. None of the conclusions drawn appear to be confounded by any differences in the mode of analysis.

In conclusion, therefore, there is evidence that atropine alkaloid containing asthma cigarettes have mild bronchodilator activity and like many other traditional remedies are not devoid of pharmacological

activity. However, in view of increasing evidence of abuse, there appears to be good reason to restrict the availability of these preparations. Although a herbal cigarette might possibly be recommended for the asthmatic who insists on continuing to smoke, for the

great majority of asthmatic patients alternative, effective anticholinergic bronchodilator therapy with a standardised, metered aerosol (ipratropium) is available and offers distinct advantages in therapeutic practice.

References

- BALLANTYNE, A., LIPPIETT, P. & PARK, J. (1976). Herbal cigarettes for kicks. *Br. med. J.*, **2**, 1539–1540.
- BARNETT, A.H., JONES, F.W. & WILLIAMS, E.R. (1977). Acute poisoning with Potter's asthma remedy. *Br. med. J.*, **2**, 1635.
- BETHEL, R.G.H. (1978). Abuse of asthma cigarettes. *Br. med. J.*, **2**, 959.
- BLEICHERT, A. (1975). The effects on salivation and heart rate following intravenous injection of Sch 1000 and Sch 1000 MDI in healthy volunteers. *Postgrad. med. J.*, **51**, Suppl. 7, 92.
- DOLLERY, C.T., DAVIES, D.S., DRAFFAN, G.H., DARGIE, H.J., DEAN, C.R., REID, J.L., CLARE, R.A. & MURRAY, S. (1976). Clinical pharmacology and pharmacokinetics of clonidine. *Clin. Pharmac. Ther.*, **19**, 11–17.
- HAMM, J. (1975). FEV_{1.0} and heart rate following administration of equal dosages of Sch 1000 as an intravenous injection and by metered dose inhaler (MDI) in patients with chronic obstructive airways disease. *Postgrad. med. J.*, **51**, Suppl. 7, 93.
- HARRISON, E.A. & MORGAN, D.H. (1976). Abuse of herbal cigarettes containing stramonium. *Br. med. J.*, **2**, 1195.
- HERXHEIMER, H. (1959). Atropine cigarettes in asthma and emphysema. *Br. med. J.*, **2**, 167–171.

(Received March 13, 1980)