

PRELIMINARY STUDIES ON NASAL DECONGESTANT ACTIVITY FROM THE SEED OF THE SHEA BUTTER TREE, *BUTYROSPERMUM PARKII*

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- 1 The seed of *Butyrospermum parkii* yields shea butter which according to local traditional healers relieves inflammation of the nostrils.
- 2 Since there is as yet no absolutely satisfactory nasal decongestant in clinical use, it was decided to investigate the effects of shea butter in nasal congestion. The substance was prepared in the laboratory.
- 3 The human subjects used were those suffering from rhinitis with moderate to severe nasal congestion. They were divided into the test group which received shea butter, the control group which was treated with xylometazoline and the 'placebo' group which received white petroleum jelly B.P.
- 4 The results showed that nasal congestion was relieved more satisfactorily in the test group than in the other two groups.
- 5 It is concluded that shea butter may prove more efficacious in nasal congestion than conventional nasal drops.

Introduction

Butyrospermum parkii belongs to the botanical family Sapotaceae of the botanical order Ebenales. It grows into a tree about 30–40 feet high and is roughly similar in stature to a full-grown mango tree. The fruit has an outer fleshy edible portion attached to an oval shaped stony seed. The seed consists mainly of two swollen oily cotyledons (kernel) enclosed within an inner soft tegmen, and an outer thick hard testa. It is from the kernel that shea butter is obtained.

In modern orthodox medicine, shea butter is used as ointment base (Oliver, 1960). In traditional Nigerian medicine it is employed as an emollient which is applied topically on the skin and mucous membranes in scabies, ulcers, nasal stuffiness and other conditions.

Most of the clinically available nasal decongestants, applied as nasal drops, e.g. xylometazoline and naphazoline (Scholz, 1945), are generally unsatisfactory (Feinberg & Friedlander, 1945; Goodman & Gilman, 1975) because of problems such as rebound nasal congestion or occasional mucosal damage. For this reason, it was decided to investigate the effect of shea butter on the inflamed mucous membrane of the nose and compare with the effects of a typical conventional nasal drops, xylometazoline.

Methods

Preparation of shea butter

The seeds were collected from Kaduna, Oyo and Zaria areas of Nigeria. They were washed, boiled in distilled water for at least 1 h and dried by spreading out in the sun for 5.5 h (10.00–15.30 h) daily for a period of 4 weeks. After the drying, each seed was cracked to remove the testa and the tegmen which separated easily exposing the kernel. The seeds on the average weighed 15.5 g–17.0 g when collected, and 11.0 g–14.5 g after drying, and the average weight of the kernels was 8.0 g–10.5 g. The kernels were then washed with distilled water, dried and were finely ground up in a grinding mill.

The ground up material was next thoroughly and carefully mixed with distilled water, a little at a time, until a thick smooth creamy paste was obtained. This paste was taken up in 20 volumes of distilled water, stirred vigorously for about 30 min and then left at room temperature for 24–48 h. During this period, globules of a greasy soft waxy solid separated and collected on the surface of the solution. This product was separated and boiled to remove moisture and on being allowed to cool, solidified as shea butter. Thus, from the kernels weighing 1,105 g, 198 g of shea butter was obtained.

The foregoing procedure for shea butter extraction is similar to the traditional method used by local producers in Nigeria.

Human subjects

Thirty-three subjects, all Nigerians, 18 males and 15 females, were used. They consisted of staff of the College of Medicine of the University of Lagos, members of their families and friends. Their ages ranged between 12 and 50 years. They all suffered from nasal congestion which accompanied mainly rhinitis of the allergic seasonal type. Any case not responding to symptomatic treatment within 6 h, or known to have been on antibiotic medication up till at least 3 weeks previously, was rejected. In this way, conditions like sinusitis, for instance, were excluded from the experiments so as not to delay appropriate treatment, and the study was thus confined primarily to symptomatic relief of nasal congestion. All the subjects had moderate to severe or complete nasal blockade. Mild cases, where breathing through the mouth was absolutely unnecessary, were rejected. Some of these later developed into the moderate or the severe type and were then included in the experiments. The 33 subjects were allocated randomly to three treatment groups, notably, the test group which was treated with shea butter, the control group treated with xylometazoline, 0.1% solution, and the placebo group treated with white petroleum jelly B.P. (Vaseline). The test group consisted of twenty-one subjects, twelve males and nine females. There were seven subjects in the control group comprising three males and four females. Five subjects were included in the placebo group, three of these were males and the remaining two, females.

Immediately moderate to severe nasal congestion was established, about 2–4 g of shea butter or petroleum jelly was quickly applied to the interior of the nose of each subject by means of the subject's

right index finger after the nail had been cut quite short. The outside of the nose was wiped clean of any excess shea butter or petroleum jelly, using tissue paper. The application to the nostrils was repeated as soon as congestion set in again. In the control group, with the head held well back, 2–3 drops of xylometazoline were dropped into each nostril and the head held in that position until the taste of the nasal drops was felt in the mouth. As soon as congestion returned, the drops were applied again in the same way.

The frequency of application of shea butter, xylometazoline or petroleum jelly B.P. thus depended on how often congestion returned during the period of the test on each subject. Neither shea butter nor petroleum jelly was sniffed forcibly into the nose. In this way, the risk of pneumonia from either substance was minimized or prevented.

The experiments on each subject were continued for 96 h except for the placebo group (see below).

Results

In all the subjects in the test group, i.e. the one that received shea butter, the airways cleared within 0.5–1.5 min of application. Breathing became easy and normal and remained so for 5.0–8.5 h. Congestion did not recur after 12–24 h with two to four applications of shea butter. In the control group receiving xylometazoline as nasal drops, the airways cleared rather more quickly in 0.3–1.0 min and remained so for only 2–4.5 h after each application. There was non-recurrence of congestion in about 48–72 h after 10–15 applications. During this period, there was also nasal irritation, redness and pain in the nostrils. In the placebo group, i.e. the group treated with petroleum jelly B.P., the congestion was not really relieved in any of the five subjects, one of the subjects felt very slight decongestion which began

Table 1 Effects of shea butter, xylometazoline and petroleum jelly B.P. in nasal congestion

| | <i>Shea butter</i> | <i>Xylometazoline (0.1% solution)</i> | <i>Petroleum jelly</i> |
|--|--------------------|---|----------------------------|
| Number of subjects | 21 | 7 | 9 |
| Dose | 2.0–4.0 g | 2–3 drops (a) | 2.0–4.0 g |
| Onset of action (min) | 0.5–1.5 | 0.3–1.0 | (b) |
| Duration of action (h) | 5.0–8.5 | 2–4.5 | (b) |
| Period from first dose till congestion ceased to recur (h) | 12–24 | 48–72 | (b) |
| Number of doses during this period | 2–4 | 10–15 | (b) |
| Side effects | none | nasal irritation | (b) |

(a) 0.05 ml per drop

(b) See text. Congestion not relieved; test abandoned 3 h after application

about 3.0 min after application, lated for 1.5 min after which a somewhat more intense congestion set in.

The uncomfortable inspiratory and expiratory movements which were thus not relieved, persisted. Since the inspiratory aspect for instance could eventually lead to lipid pneumonia and hypoxia the test was abandoned for each subject 3 h after the application of petroleum jelly.

These results are summarized in Table 1.

Discussion

In nasal congestion, there is inflammatory oedema of the upper respiratory mucosa (nose and larynx) accompanied by airways obstruction. Drugs commonly used for the symptomatic relief of this condition are mainly vasoconstrictors usually administered as nasal drops e.g. naphazoline (Privine), xylometazoline (Otrivin). These drugs do give relief but are not without undesirable effects. They irritate the nostrils and cause ischaemia of the nasal mucous membrane which later gives rise to secondary hyperaemia and further inflammatory oedema, i.e. a rebound or reactionary congestion. This tends to perpetuate the use of the drugs with consequent damage to the nasal mucosa. The results with xylometazoline seem to confirm these points. Although the onset of action was rapid, the action was not well sustained. It lasted only 2–4.5 h after each application, whereas the shea butter had a much longer duration of action of 5.0–8.5 h. Its onset of action, however, was slightly less rapid (0.5–1.5 min). Before the congestion cleared completely and seemingly permanently (from the particular attack), 10–15 applications of xylometazoline were required and it took 48–72 h. Further, during the period, nasal

irritation developed and this would lead to nasal mucosal damage. With shea butter, 2–4 applications only were needed and the congestion was completely cleared in 12–24 h, no rebound congestion, or damage to the nasal mucosa developed. In the 'placebo' group, petroleum jelly was used for two main reasons. The first is that like shea butter, it is employed as an ointment base for surface action. Secondly, there are as yet no reports to associate it with nasal decongestant activity. In these experiments, however, it proved devoid of any activity in nasal congestion.

It seems clear from these results that shea butter, as a nasal decongestant, is superior in potency and duration of action to conventional nasal drops typified by zylometazoline. Its effectiveness does not appear to be due to mere surface action arising from its use as an ointment base since petroleum jelly, which is also used as an ointment base, does not relieve nasal congestion. Work concerned with isolating or identifying the relevant active ingredient(s) should prove quite fruitful. Shea butter is also free from those undesirable side-effects associated with conventional nasal drops. Thus, its action is fairly prompt, and the effect reliable and prolonged. It neither irritates the nasal mucosa nor does it cause 'rebound' congestion. Its oily and greasy nature notwithstanding, it may well become a widely accepted nasal decongestant.

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