INTRODUCTION
Recently, Singh et al. (1978, 1980) have reported adaptogenic and tumour preventing properties in ‘Geriforte’, a geriatric tonic. The ‘adaptogens’ are known to induce a state of non-specific increased resistance (SNIR) in the organism and thus help it to defend against the adverse effects of stress of any kind, biological, physical or chemical in nature. (Brekhman and Dordymov, 1969). Geriforte being an adaptogen (anti-stress drug) was deemed worthy of evaluation for its anti-viral properties in the present study. Its anti-viral effects were studied against experimentally-induced vaccinia in guinea pig, an animal well known for its sensitivity to the vaccinia virus (Bedi, 1966).

MATERIALS AND METHODS
The method followed to study the anti-viral effect was essentially the same as described by Singh et al. (1971). Healthy young guinea pigs of either sex, weighing between 200-250 g, were prepared for vaccination as follows. An area of 2 sq cm on the back was shaved nicely with a sharp razor. Abrasions were avoided. Then the area was cleaned with ether and was allowed to dry for 10 minutes. A drop of prepared vaccine (lyophylized purified living vaccinia virus) was put on the skin and a linear scar of 3 mm length was made in epidermis with a sharp sterilised needle. Those animals in which bleeding occurred were discarded from the study.

Four groups comprising of 20 animals each were caged separately in identical environmental conditions and diet. In Group I no drug treatment was given and sham procedure was carried out without application of the vaccine (Sham or Non-vaccinated Control). Group II of animals was vaccinated but did not receive any drug (Vaccinated Control). In Group III, daily pretreatment with Geriforte (100 mg/kg orally) was started 5 days before vaccination and continued till 3 days after vaccination. In Group IV the drug was administered from third to seventh day after vaccination.

The sited vaccination was observed daily for the development of vaccinal reactions (erythema, papule, vesicle, pustule and scab). Moreover, rectal temperature, food intake and body weight were also recorded daily. On the 5th day of vaccination, the area of local reaction in different groups was measured and compared.

Mortality – At the end of two weeks after vaccination the mortality in each group was noted.
RESULTS

1. General Effects on

a) Body temperature, body weight and food intake

There was a rise of body temperature (range 103° to 105°F) from 5th day to 10th day in vaccinated non-drug-treated control group. The maximum rise was on the 7th day. In the Geriforte-treated groups (III and IV) slight rise of temperature was observed but it was insignificant and did not differ from non-vaccinated control. There was 25 per cent reduction in body weight and 20 per cent reduction in food intake in Group II animals as recorded on 7th day. The loss of body weight and food intake was gradual, starting from the 1st day and was maximum on the 7th day, then recovery occurred.

b) Mortality

At the end of two weeks, 40 per cent animals died in Group II (control) and 5 per cent in Group IV, while in Group I (Sham control) and Group II (pre-treated with Geriforte) no animal died.

2. (a) Effect on the course of development of local reaction induced by vaccinia

In Group II (Vaccinated Non-drug-treated) all the animals developed erythema, papules, vesicles, pustules and scabs on the 1st, 3rd, 5th, 8th and 11th day respectively (Fig. 1). In Group III, where the drug was started before vaccination, only erythema and papule were observed and it subsided on the third day. The other stages could not be seen (Fig. 1). In the last group where the drug was given during the course of development of reaction, all the stages were observed but pustules and scabs developed much earlier (7th and 8th day respectively) thereby reducing the total duration of entire reaction (Fig. 1).

(b) Effect on the area of local reaction, induced by vaccinia, on the 5th day

The areas of local reaction induced by vaccinia on the 5th day were measured and are summarised in Table 1. There was no development of reaction in Group I (Sham Control) and Group III (pretreatment started before vaccination). In the vaccinated control,
the average area was 28.6 ± 4.2 sq mm whereas in Group IV where the drug was started after vaccination, the area of reaction was 12.2 ± 2.4 sq mm which was significantly less than that measured in the vaccinated controls.

Table 1: Effect of Geriforte on the local reaction induced by vaccinia virus in guinea pigs (as on day 6)

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Groups</th>
<th>Drug mg/kg p.o.</th>
<th>No. of animals</th>
<th>Average area in sq. mm ± SE</th>
<th>‘p’ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Sham Control</td>
<td>0</td>
<td>20</td>
<td>0</td>
<td>–</td>
</tr>
<tr>
<td>2.</td>
<td>Vaccinated control</td>
<td>0</td>
<td>15 (5)</td>
<td>28.6 ± 4.2</td>
<td>&gt;0.01</td>
</tr>
<tr>
<td>3.</td>
<td>Geriforte pre-treatment 5 days + 3 days after vaccination</td>
<td>100</td>
<td>20</td>
<td>0</td>
<td>–</td>
</tr>
<tr>
<td>4.</td>
<td>Geriforte treatment from day 3 to 7 after vaccination</td>
<td>100</td>
<td>19 (1)</td>
<td>12.2 ± 2.4</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

Figures in parenthesis indicate number of dead before 6th day.

DISCUSSION

Geriforte, a combination of several plants and other ingredients is being used in this country as a geriatric tonic. Several reports of its usefulness in a variety of illnesses have been recently reported (Lobo et al., 1975; Sahgal and Sood, 1975; Vagh et al., 1975; Singh and Sinha, 1980): However, no rational approach was made to assess as to how a drug combination could be effective in a number of diseases, till Singh et al. (1978) found in animal experiments that the drug is capable of inducing a state of non-specific increased resistance (SNIR) in animals in a variety of stressful situations and thus it is an adaptogen/anti-stress drug. Considering the above facts and the presence of other plant adaptogen in Geriforte reported by Singh et al. (1980), its anti-viral activity was evaluated against live vaccinia virus in guinea pigs.

The results show that Geriforte reduced the course of development and duration of vaccinal reaction, both general and local. Pre-treatment was more effective than when the drug was administered during the course of development of vaccinia (Fig. 1). Thus its preventive effects are more marked. This is quite possible because the drug appears to act through activation of immune responses as reported earlier, by increasing the total lymphocyte count in mice (Singh et al., 1980) or through hitherto unknown non-specific mechanisms which induce SNIR. The inhibitory effect of Geriforte on vaccinal reactions due to its immunosuppressant effect if any is ruled out, because of the fact, that it would have flared up the viral infection and caused increased mortality. On the other hand, Geriforte provided protection against all the ill-effects and prevented mortality from vaccinia. The loss of body weight and food intake in vaccinated Group II was perhaps due to the pyrexia and general effects of vaccination which were prevented by Geriforte.

Geriforte appears to have an anti-viral effect against live vaccinia viruses. Elaborate anti-viral studies on more experimental models and in human viral diseases are indicated.
SUMMARY
Geriforte, an adaptogenic or anti-stress drug, is being used in this country as a geriatric tonic. Adaptogens are capable of inducing a state of non-specific increased resistance in the organism. Thus, it is of interest to evaluate its anti-viral activity also. The experiments were carried out in guinea pigs and its effect against live vaccinia virus was studied. All the stages of vaccinal reaction (erythema, papule, vesicle, pustule and scab) were observed in different groups of animals. The vaccinated group showed all the stages of local reaction and general effects of vaccination, which lasted for 13 days. Among Geriforte pre-treated animals there was marked inhibition of the local reactions as well as general effects. When Geriforte was administered during the development of the reactions, it reduced the duration of development of local reaction and general effects, but could not fully nullify the effects. Thus it appears that the drug induces some immune stimulant effects which inhibit the virus which is evidenced by the fact that pre-treatment with Geriforte was more effective than when the drug was administered during the course of development of vaccinia.

REFERENCES