whereas, 0.1% being supra-optimal did not prove beneficial and the lowest concentration of the vitamin (0.001%) tried went unnoticed. The synthesis of additional amount of protein from liberated amino acids also accounted for the increased level of soluble protein. Further beneficial effect of pyridoxine in the process of seed germination is not altogether surprising as vitamin is a coenzyme in amino acid synthesis[17], where organic acids produced during oxidation of carbohydrate in Kreb's cycle are used.

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Auxin–phenol-induced rooting in a mangrove, *Rhizophora apiculata* Blume

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The hypocotyls of *Rhizophora apiculata* responded well to auxin and phenol treatments for rooting. Treatment of hypocotyls with indole-3-acetic acid (IAA) (0.05 mg/l) promoted root length by 1.9-folds over the control. The phenolic acid and IAA synergism was well pronounced in root initiation rather than in root elongation. Of the phenols studied, 1,3,5-benzenetriol in combination with IAA induced 16 roots per hypocotyl as against 10 in control. The rooted seedlings were easily established in the soil.

Rhizophora apiculata is a common mangrove species, which propagates through viviparous seedlings. The hypocotyls often exhibit poor rooting resulting in inefficient establishment of seedlings in loose and muddy soil of the coastal environment[1]. To overcome this, an attempt was made to enhance the rooting of the hypocotyls by application of auxins and phenolic compounds.

Healthy hypocotyls of *Rhizophora apiculata* Blume. with length of 27 ± 2 cm were collected from an individual plant in April 1989 from the Pichavaram mangroves (11°27'N, 79°47'E), Tamil Nadu. The hypocotyls were placed separately in 500 ml beakers containing 250 ml of test medium. The experimental media used were prepared using seawater (salinity 15 g/l) with auxins—indoleacetic acid (IAA) and indolebutyric acid (IBA) at 0.05, 0.5, 1.0, 2.0, 5.0, 10.0 mg/l each. Phenolic compounds—caffeic acid, catechol, ferulic acid, gallic acid, 1,3,5-benzenetriol, salicylic and tannic acids (Sigma Chemicals, USA)—were administered at 1, 10, 100 mg/l with or without IAA (2 mg/l). All media were adjusted to pH 7. Four replicates were taken for each treatment. The control received seawater alone. The beakers were wrapped with black paper and incubated in diffused light at ambient temperature of 27 ± 2°C. After 15 days of incubation, root growth characteristics were recorded.

IAA and IBA enhanced root length at lower concentrations with range of 1.3- to 1.9-fold (Figures 1 and 2). However, the increase in the number of roots was not significant. IAA at 0.05 mg/l greatly promoted root length by 1.9-fold compared to the control. Higher concentrations of IBA (2, 5, 10 mg/l) were found to have inhibitory effect on rooting (Figure 2).

†For correspondence.

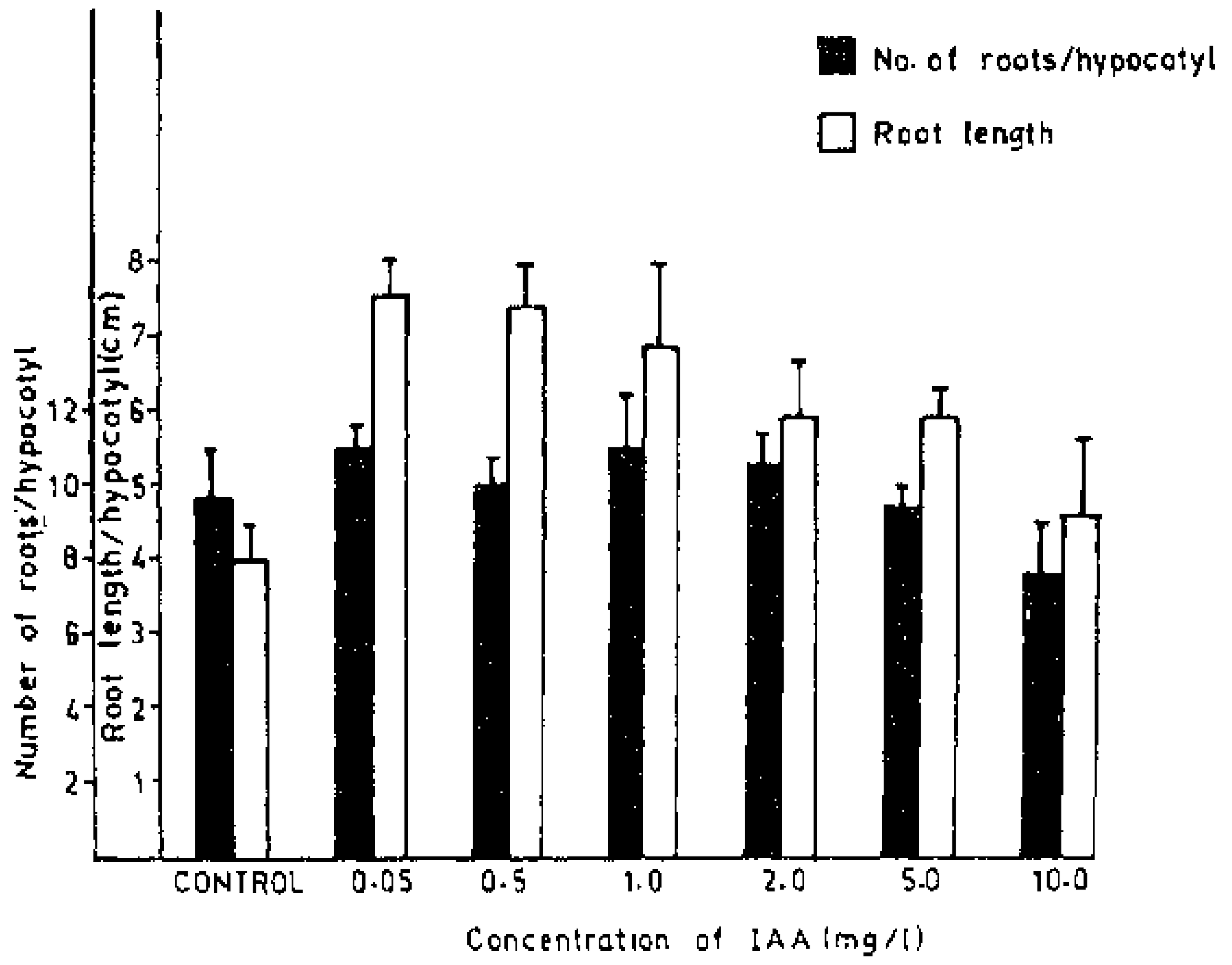

Figure 1. Effect of indoleacetic acid on rooting of *R. apiculata* hypocotyls.

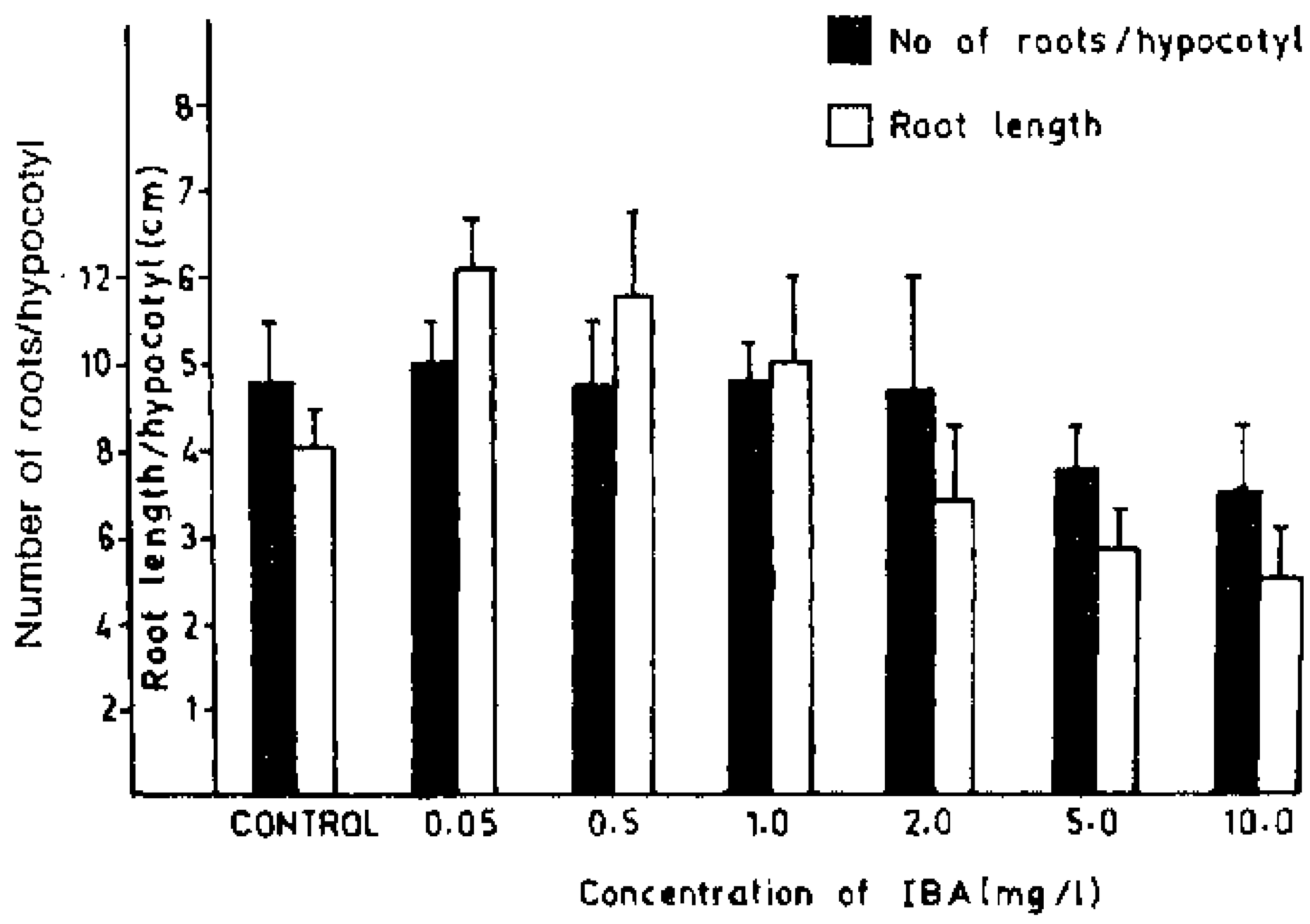

Figure 2. Effect of indolebutyric acid on rooting of *R. apiculata* hypocotyls.

Table 1. Phenol–IAA-induced effect on rooting of *Rhizophora apiculata* Blume. hypocotyl.

	Number of root/hypocotyl*		Length of root hypocotyl*	
Phenol	−IAA	+IAA	−IAA	+IAA
Control	9.5	10.0	4.00	5.85
Caffeic acid				
1 ppm	10.0	6.0	5.50	6.22[b]
10 ppm	14.0[a]	10.5	5.61	5.44
100 ppm	11.5	10.5	7.03[a]	5.87
Catechol				
1 ppm	10.5	7.0	6.10[a]	4.47
10 ppm	9.5	9.0	5.82	5.59
100 ppm	8.0	10.0[b]	4.89	4.05
Ferulic acid				
1 ppm	8.5	8.5	5.99[a]	4.47
10 ppm	14.0[a]	10.0	5.54	5.67
100 ppm	8.0	10.0[b]	4.19	5.73[b]
Gallic acid				
1 ppm	14.5[a]	10.5	7.26[a]	6.92
10 ppm	8.0	6.5	6.25	6.06
100 ppm	7.5	7.5	5.26	4.89
1,3,5-benzenetriol				
1 ppm	6.5	12.0[b]	6.49[a]	6.43
10 ppm	9.5	16.0	5.68	4.82
100 ppm	12.0[a]	8.5	4.38	4.68
Salicylic acid				
1 ppm	9.5	11.5	6.50[a]	6.13
10 ppm	9.0	11.5[b]	6.10	6.34
100 ppm	10.0	9.5	4.39	6.12[b]
Tannic acid				
1 ppm	8.0	11.5[b]	6.98[a]	6.34
10 ppm	10.0	8.5	6.60	6.05
100 ppm	10.5	9.0	6.45	5.47

*Average value of 4 replicates.
[a]Significant at 1% to control.
[b]Significant at 1% to its corresponding phenolic treatment (−IAA).

Phenolic compounds when applied alone, increased the number of roots (Table 1). The increase ranged from 1.3- to 1.5-fold in treatments of 1,3,5-benzenetriol (100 mg/l), ferulic acid (10 mg/l) caffeic acid (10 mg/l) and gallic acid (1 mg/l). Influence of 1,3,5-benzenetriol on rooting response is shown in Figure 3. The phenolic compounds, when combined with IAA (2 mg/l) also increased the number of roots (Table 1). In these treatments the root formation was increased by 1.3- to 1.9-fold in ferulic acid (100 mg/l), catechol (100 mg/l), salicylic acid (10 mg/l), tannic acid (1 mg/l) and 1,3,5-benzenetriol (1 mg/l).

Phenolic compounds when used singly, enhanced the root length (Table 1) with a range of 1.5- to 1.8-fold in ferulic acid (1 mg/l), catechol (1 mg/l), salicylic acid (1 mg/l), 1,3,5-benzenetriol (1 mg/l), tannic acid (1 mg/l), caffeic acid (100 mg/l) and gallic acid (1 mg/l). The phenolics in combination with IAA (2 mg/l), also promoted the root elongation with increase of 1.1- to 1.4-fold in only few cases like caffeic acid (1 mg/l), ferulic acid (100 mg/l) and salicylic acid (100 mg/l) (Table 1).

Auxins or certain phenols are known for their promotorial effects in rooting of many non-mangrove plants[2–5]. It has been shown that phloridzin, the 2′-glucoside of phloretic acid and its degradation products, 1,3,5-benzenetriol and phloretic acid, can significantly enhance the growth of shoots and roots of apple root stocks cultured *in vitro*[2,3]. Effects of 1,3,5-benzenetriol on viviparous seedlings are reported here for the first time. Basu *et al.*[5] found that phenolic compounds like salicylic acid, gallic acid and tannic acid when used alone, did not show any conspicuous root-promoting effect but did so with auxins in the case of leafy cuttings of *Eranthemum tricolor*.

In the present study, phenols promoted root growth, when applied singly and also showed synergistic action with IAA, in few cases (Table 1). The phenol–IAA synergism was well pronounced in root initiation rather

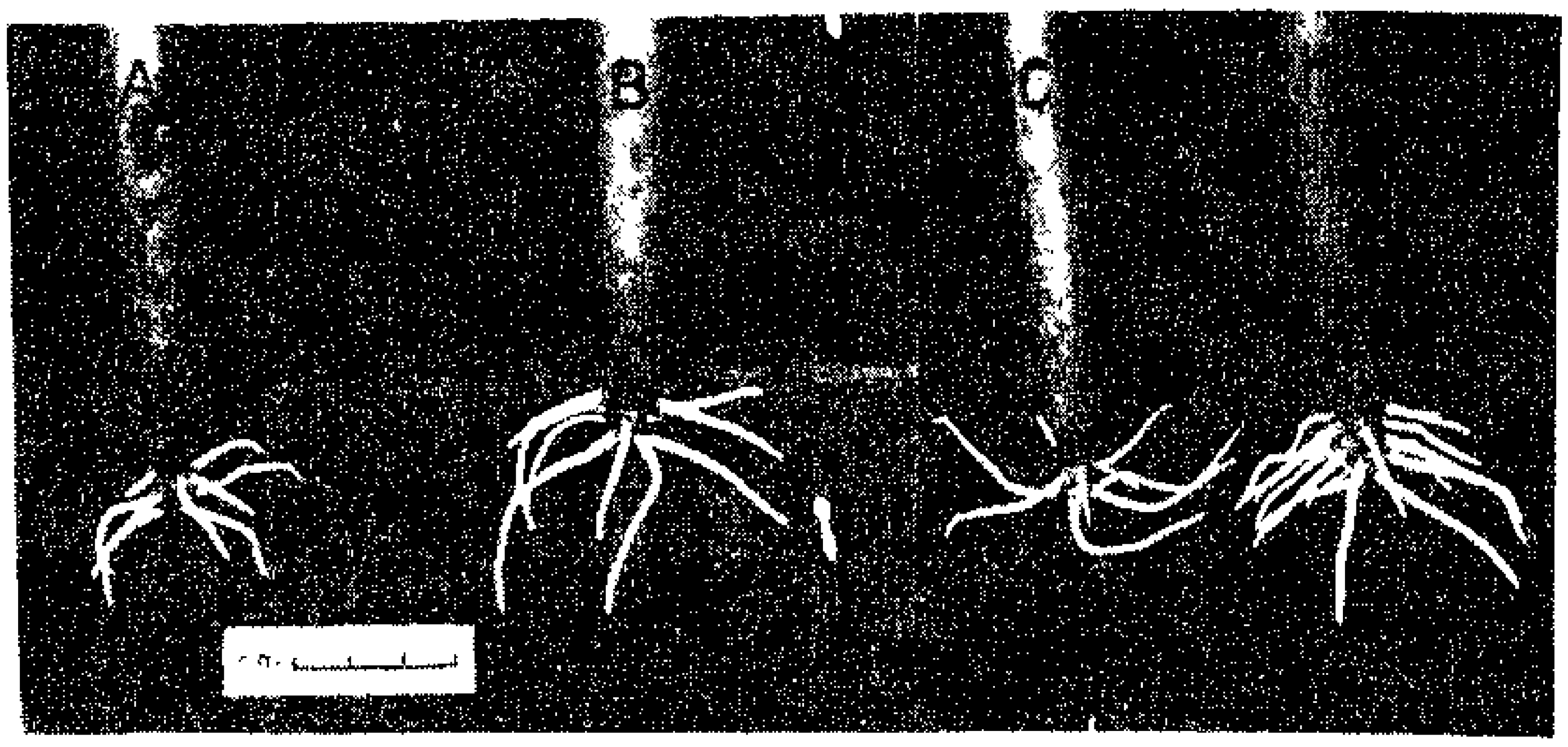

Figure 3. Influence of 1,3,5-benzenetriol and indoleacetic acid on rooting of hypocotyls of *R. apiculata*. A, Seawater control. B, 1,3,5-Benzenetriol (1 mg/ml). C, Indoleacetic acid (2 mg/ml). D, 1,3,5-Benzenetriol (1 mg/ml)+IAA (2 mg/ml).

than in root elongation. For instance, increase in number of roots was by 1.9-fold whereas in root length it was only 1.4-fold, as maximum effect of phenol–IAA synergism (Table 1). Of the phenols studied, 1,3,5-benzenetriol had promising synergistic effect with IAA in promoting the number of roots (Table 1) as reported in many fruit trees[2,3]. Besides this, either gallic acid (1 mg/l) (Table 1) or IAA (0.5 and 0.05 mg/l) (Figure 1) could be used for efficient rooting of *R. apiculata*. The rooted seedlings easily got adapted in the soil when planted after the above treatments. Hence the treatments will be beneficial in raising vigorous seedlings in nurseries for conservation and management of the mangroves. This will augment easy adaptation of the seedling which is otherwise difficult.

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Cimetidine-induced histopathological changes in testes of albino mice

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Cimetidine [*N*-cyano-*N*′-methyl-*N*′-2(5-methyl-1*H*-imidazol-4-yl)methylthioethylguanidine] is used as anti-ulcerative drug and is known to inhibit gastric acid secretion and to reduce pepsin output. It was tested on Swiss albino mice. Mice given 15 mg/kg of the drug orally showed damage of testicular elements just after one week of treatment. Testis sections showed coalescence of cells to form multinucleate bodies in most of the tubules whereas Sertoli cells, spermatogonia and spermatocytes appeared in their normal positions. However, after 2 weeks of treatment with the same dose, considerable damage in the tubules was evident. Even after the recovery phase, a significant alteration in the weight of testis with reduction in sperm count was observed.

A recent advance in medical management of peptic ulcer has been the introduction of the histamine H_2 receptor antagonist, Cimetidine. Most of the reports on Cimetidine showed that this antiulcerative drug has been associated with gynaecomastia as a side effect[1]. Early toxicological studies with Cimetidine showed a decrease in prostate and seminal vesicle weights in rats and dogs treated with the drug orally[2,3]. Occasional reports of Cimetidine-associated gynaecomastia have appeared in the literature[4–6]. Other side-effects noted in clinical usage suggested the possibility of interaction with androgen or estrogen receptors, which can affect the target organs. This prompted us to study the histopathological effect of Cimetidine on testes of albino mice.

Swiss albino male mice of Lacca strain, of age 75–100 days and weighing around 26 g, were used. They were