ria sp., *Drechslera* sp., *Fusarium* sp., *Mucor* sp., *Penicillium* sp., *Rhizopus oryzae*, and *Scopulariopsis* sp. At 50 mg/ml the growth of *Syncephalastrum* sp. was inhibited as well, but *Aspergillus niger* remained unaffected [30]. Oral administration of berberine sulfate at doses of 350–700 mg/kg was effective in treating *Candida albicans* infections of the intestine in mice [31]. Coptisine showed a greater antimicrobial effect against *Saccharomyces carlsbergensis* than berberine, palmatine, and jatrorrhizine [32].

Berberine sulfate administered to rats at doses of 100 mg/kg 10 days after experimentally induced intestinal amebiasis was effective in 80% of the animals [33]. It completely inhibited the growth to trophozoites of *Entamoeba histolytica* at concentrations of 0.5–1 mg/ml in vitro, and was active in vivo against infections with *E. histolytica* in hamsters and rats [34].

47.3.2 Antiinflammatory Effect

The antiinflammatory activity of berberine was confirmed by some test methods [35, 36]. Subcutaneous injection of berberine sulfate together with cholera toxin dose dependently inhibited toxin-induced inflammation in the neck of rats; separate injection of berberine sulfate also had antiinflammatory effects [37].

47.3.3 Antitumor Activity

Berberine sulfate (50 μg/ml) and berberine chloride (25 μg/ml) showed growth inhibition of Ehrlich and lymphoma ascites tumor cells [38]. The presence of berberine in granules inside the cells was detected by its fluorescence [39]. Berberine and tetrahydroberberine inhibited oxidation of DL-alanine in rat kidney homogenate [40]. Berberine was the most cytotoxic alkaloid isolated from *Thalictrum minus elatum* with 70% inhibition of protein synthesis in KB cells at a concentration of 1 μg/ml [41]. The cytotoxic ED_{50} values of berberine in HeLa cell cultures were 3.5–30.0 μg/ml [42].

Berberine and tetrahydroberberine showed no antitumor activity against sarcoma 180 ascites tumors in mice, but berberrubine chloride, the 9-*O*-demethyl analog of berberine, and its esters had strong antitumor activity [43]. Berberine chloride inhibited the formation of DNA, RNA, proteins, and lipids as well as the oxidation of [^{14}C]glucose to $^{14}CO_2$ when incubated with S180 cells in vitro. Protein and RNA syntheses were most sensitive to berberine [44].

Berberine chloride and berberine sulfate activated macrophage-mediated inhibition of [^{3}H]thymidine incorporation into EL4 leukemia cells. The activation of macrophages by berberine was not augmented by the addition of a suboptimal dose of macrophage-activating factor. It was concluded that berberine is a potent activator for macrophages to induce inhibition tumor cells in vitro [45].

47.3.4 Cardiovascular Actions

Intravenous infusion of berberine sulfate to rats lowered the blood pressure in a dose-dependent manner. A significant hypotensive effect was followed by bradycar-