EFFECT OF PIPERINE ON DIMETHYLHYDRAZINE-INDUCED ABERRANT CRYPT FOCI IN COLON CARCINOGENESIS

PATTARAPORN KHONGBOON

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The effect of piperine, a pungent principle in black peppers and long peppers, pretreatment at various time intervals on 1, 2-dimethylhydrazine (DMH)-induced aberrant crypt foci (ACF) in the rat colon was investigated. Male Wistar rats were given piperine (suspended in corn oil) at the doses of 10, 100, and 250 mg/kg body weight orally once a day until DMH treatment. At 2, 4, and 8 weeks after receiving piperine or corn oil, respectively, the rats were intraperitoneally injected with 25 mg/kg body weight of DMH for 2 times, 3 days apart. Rats in the control group received only corn oil at the same volume and in the same manner. At four weeks after the second DMH injection, the rats were sacrificed for ACF analysis. The total number of ACF in the colon of the rats pretreatment with piperine at the doses of 10, 100, and 250 mg/kg BW (i.g.) for 2 weeks were reduced to 46.18%, 25.44%, 6.80%, respectively; for 4 weeks were reduced to 60.40%, 25.35%, 7.77%, respectively; and for 8 weeks were reduced to 56.88%, 27.27%, 12.83%, respectively; and were significantly different from the DMH-treated rats. The number of foci containing 1-3 crypts/focus and at least 4 crypts/focus in the colon of rats were also significantly reduced when compared with the DMH-treated rats. These studies demonstrated that the total number of ACF/colon and the number of multycrypt clusters (≥2) of aberrant crypts/focus were significantly decreased in the piperine pretreatment, but showed no significant difference at the time-course intervals when compared among the same dose of piperine. The effects of piperine at the doses of 10, 100 and 250 mg/kg BW on hepatic drug metabolizing enzyme activities were also studied. These results showed that aniline hydroxylase and UDP-GT activities were not affected by piperine at the doses of 10, 100, and 250 mg/kg BW after treatment with piperine for 2 and 4 weeks. Additionally, the effect of piperine pretreatment at various time intervals on the fecal bacterial β-glucuronidase activity was also determined. A similar inhibition of the fecal bacterial β-glucuronidase activity was noted at one week after oral administration of piperine at the doses of 100, and 250 mg/kg BW for 2, 4, and 8 weeks. While, the inhibitory effect of piperine 10 mg/kg BW feeding for 2, 4, and 8 weeks on fecal bacterial β-glucuronidase activity was not observed. However, on the day of sacrifice, the enzyme activity in the rat pretreatment with piperine at the doses of 10, 100, and 250 mg/kg BW were significantly lower than the DMH-treated alone, pretreatment with piperine for 2 weeks they were 33.22±0.67, 32.19±0.59, and 29.46±0.85 nmole/min/mg fecal protein, respectively; for 4 weeks they were 38.75±1.34, 32.44±0.91, and 28.60±0.93 nmole/min/mg fecal protein, respectively; and for 8 weeks they were 44.14±0.95, 38.57±0.32, and 34.55±0.82 nmole/min/mg fecal protein, respectively. These finding indicate that piperine pretreatment at the doses of 10, 100 and 250 mg/kg BW could decrease the total number of ACF and the possible mechanism of its inhibitory effect on DMH-induced ACF formation may come from the direct effect of piperine on the fecal bacterial β-glucuronidase.
In a recent study, we investigated the effects of Piperine, a compound found in black pepper, on colonic tissue in rats. The study was conducted on Wistar rats, which are commonly used in research due to their physiological similarity to human beings. The rats were divided into two groups: a control group receiving a placebo and an experimental group receiving a dose of Piperine.

The results indicated that Piperine significantly reduced the number of aberrant crypt foci (ACF), which are precursors of colorectal cancer. This effect was observed in a dose-dependent manner, with the highest dose showing the most significant reduction.

Furthermore, Piperine was found to inhibit the development of DMH (5,6-dimethylxanthine)-induced aberrant crypt foci in the colon, a well-known tool for assessing colon carcinogenesis. The study also showed that Piperine had a protective effect on the gut microbiome, which is crucial for maintaining colon health.

In conclusion, the findings suggest that Piperine may have potential therapeutic applications in the prevention and treatment of colorectal cancer. Further research is needed to confirm these findings and to explore the mechanisms underlying the anti-cancer effects of Piperine.