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In vitro and *In vivo* antimutagenic activity of *G. montana* stem and leaf extracts

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Abstract
The use of dietary antimutagens has been seen as a promising approach to the protection of human health. *Gymnosporia montana* is a well-known ethnomedicinal plant. The antimutagenic activity of the stem and leaf extracts of the *Gymnosporia montana* was investigated. The activity was assayed by Ames *Salmonella* mutagenicity test using histidine mutants of *Salmonella typhimurium* tester strains, TA 98, TA 100 and TA 102. Against all the mutagens 70 % methanolic and aqueous extracts of leaf of *G.montana* showed significant antimutagenic activity in a dose dependent manner. 70 % methanolic extract of leaf showed significant antimutagenic activity against all mutagens. Highest antimutagenic activity showed against benzo [*a*] pyrene (64.04 % (TA 98), and 58.48 % (TA 100) and against sodium azide 58.48% (TA 100), 58.51 % (TA 102). *In vivo* antimutagenic activity of extract was also assayed by determining the mutagenicity of the urine of rats administrated with B [*a*] P as a mutagen. The prior administration of extract markedly inhibited mutagenicity induced by B [*a*] P. The results indicated that the 70 % methanolic and aqueous extract of leaf of *G.montana* possessed significant antimutagenic activity. The results revealed that *G.montana* extract restored antioxidant defence.

Keywords: *Gymnosporia montana*, ames test, *Salmonella typhimurium*, antimutagenic activity

1. Introduction
Mutations are the cause of innate metabolic defects in cellular system, triggering the morbidity and mortality in living organism. A plethora of synthetic and natural substances, apart from various genotoxic physical and biological agents are known to act as mutagenic, co-carcinogenic and/or carcinogenic agents [1]. Since, the mutagens are involved in the initiation and promotion of several human diseases including cancer, the significant of novel bioactive phytocompounds in counteracting the promutagenic and carcinogenic effects are gaining credence. Such chemicals that reduce the mutagenicity of physical and chemical mutagens are called as antimutagens. Antimugenic and anticarcinogenic properties of a wide variety of dietary constituents and plant secondary metabolites have been reported [2, 4]. The antimutagenic or protective effect has been attributed to many classes of phytocompounds, however, such compounds have also been reported to exhibit a wide range of other biological activities [5, 6]. Natural antimutagens from edible and medicinal plants are of particular importance because they may be useful for human cancer prevention and have n undesirable xenobiotic effects on living organisms [7, 9]. The rich diversity of Indian medicinal plants have not yet systematically screened for antimutagenic activity [10, 13]. More than 800 plants are used in the treatment of various ailments in the traditional systems of Indian medicine (Ayurveda, Siddha and Unani). Based on the chemical diversity of known active polyantimutagens [14], many traditionally used Indian medicinal plants may exhibit such desired properties due to similarity in the major class of phytocompounds.
Gymnosporia montana belongs to the family *Celastraceae*. Much- branched, spinescent shrub or a small tree, occurring through the dried parts of India. The leaves of *G.montana* Are simple, stipules are small. The flowers are small and bisexual. The fruit is a capsule or berry. Stems are purplish brown, straight and hard spines, which are modified branches with single node from which leaf originates. In several Ayurvedic literatures like Nighantu Adarsh [15], Vanaspati Shashtra [16], Aryabhishek [17], Vasundhrani vanaspatio [18] the plant has been mentioned for the various uses. It is claimed to be use for curing jaundice, inflammation, rheumatic pain, gastrointestinal disorders, and also as a vermifuge [19, 23].
In vitro and *in vivo* antimutagenic activity of various extracts of stem and leaf of *G.montana* were studied.

2. Materials and Methods
2.1 Collection and authentification of plant material:
Plant material of *Gymnosporia montana* were collected from the Vijapur, Gandhinagar, Gujarat, India and was identified by Dr. S. K. Patel, Head of the Botany Department, Government Science College, Gandhinagar. The voucher specimen KB/O8/0011 has been deposited in K. B. Institute of Pharmaceutical Education and Research, Gandhinagar, Gujarat, India

2.2 Preparation of different extracts
The selected plant parts i.e., stem and leaf of *G. montana* were separated, dried under sunlight and powdered. The powdered was passed through sieve of 60 mesh (#) size and was stored in airtight containers. Shade dried stem and leaf powder were extracted successively with petroleum ether (60-80), 70 % methanol and water. The extractions were carried out using soxhlet assembly, for 6-8 hours. The process was repeated for three times in the same manner. The extracts were concentrated and dried at a temp of 60^0 C on a water bath and used for the further work.