Introduction
It is an established fact that a number of diseases are associated with food habits, lifestyle and environmental factors. High prevalence of oral and pharyngeal cancers is believed to be associated with a wide variety of chewing and smoking habits prevalent among men and women. Further, these chewing habits also contribute to other diseases of oral cavity and may also affect the hard tissue due to excessive load of mastication on teeth. Areca nut is the seed of the areca palm (*Areca catechu*) growing as semi-wild in the coastal areas of the Indian subcontinent and South East Asia. Approximately 600 million people use it as a masticatory substance worldwide. It is the fourth most commonly abused substance and only three addictive substances - nicotine, ethanol and caffeine are used more widely than areca nut (Warnakulasuriya and Peters, 2002). It is estimated that 10-20% of the world’s population chew areca nut in various forms. The habit varies greatly depending on the regional availability of areca nut as well as social custom. Most of the areca nut chewers also consume tobacco as one of the ingredients of the chewing quid. The pattern of tobacco consumption in India is different from other parts of the world. In India, about 20% tobacco users consume cigarette while nearly 40% smoke bidi. The remaining 40% of users chew tobacco and tobacco containing products such as pan masala and gutkha (Warnakulasuriya and Peter, 2002). Smokeless tobacco is consumed in a variety of ways ranging from chewing tobacco alone, tobacco with lime, tobacco with areca nut and lime, tobacco as an ingredient of betel quid (known as pan), snuff (powdered tobacco), masheri (pyrolysed tobacco product), gutkha (pan masala containing tobacco) etc. Another form of
tobacco/areca chewing habit is mawa in Western India, particularly in the state of Gujarat. Mawa is a mixture of dried pieces of areca nut, sun-cured unflavored tobacco and lime.

India has the largest areca-consuming population in the world. Areca nut (*Areca catechu*), cardamom (*Elettaria cardamomum*) and clove (*Syzygium aromaticum*) are the important adjuncts of Indian cultural milieu. Areca nut represents a deep-seated, centuries old tradition, which forms a meaningful part of the cultural and social framework in certain societies. Researchers are facing teething trouble to document the prevalence of areca nut use as it is consumed in various forms, and with different ingredients with or without tobacco. Thus, estimation of the frequency of areca nut use alone is often frustrating. More precision is required in recording the information on chewing material in order to relate various lesions with type of chewing material, duration and frequency. The composition of the chewing quid varies with region to region. Areca nut may be consumed either alone or more commonly in association with other ingredients such as tobacco, lime, catechu and other spices wrapped in a betel leaf, which is referred to as a betel quid (commonly known as pan). The quid can be made up at home, or available commercially, where sliced or powdered areca nut is one of the most consistent ingredients of quid. During the last two to three decades, use of areca nut has taken Indian society by storm in its new transformation – "Pan masala". This preparation generally contains areca nut, catechu and slaked lime with or without tobacco along with unspecified flavoring agents. *Gutkha* is a common name for pan masala having tobacco along with other ingredients. It is available in small pouches. Over 200 brands of panmasala are available in India. The increasing availability and marketing of purified, preservable preparations of areca nut only served to increase its popularity and use. Crossing all the barriers of state, language, caste and creed, pan masala has become not only popular but also become a 'status symbol' in the society. Being inexpensive, heavily advertised, convenient to store and easily
available, its use is increasing even among children and adolescents. These factors lead to the early introduction of tobacco to the teenagers in the form of pan masala, even though the restrictions are there for the sale of tobacco products to the children. Drawing attention to the harms associated with both products containing tobacco and those that do not would be significantly enhanced if more data are available on these products and their adverse effects. There is paucity of data on the prevalence of habits in various parts of the world. In India, nationwide surveys were conducted on the prevalence of chewing habit during 1960s and 1970s in the states of Gujarat, Andhra Pradesh, Bihar and Kerala, involving 50,915 people. The proportion chewing betel quid varied from 3.3% in Srikakulam in Andhra Pradesh to 37% in Ernakulam in Kerala. Among 50,915 people surveyed, 0.6% of those chewed areca nut alone compared with 11.6% who chewed betel quid with tobacco (Mehta et al. 1969). The other extensive study conducted by Malaowala et al. (1976), among 57,518 mostly urban textile workers in Ahmedabad, India. They reported pan and supari chewing by 26% out of 85% of workers who admitted to chewing habit.

Chewing areca nut along with tobacco on habitual basis is known to be deleterious to human health. A growing body of evidence over the last 40 years, mainly in the form of large-scale epidemiological and experimental studies, has shown that even when consumed in the absence of tobacco or lime, areca nut may have harmful effects on the oral cavity. However, data pertaining to its effect on hard tissues are scanty or inconclusive. Thus, the effects can be divided into two broad categories: those affecting the dental hard tissues, which include teeth, their supporting periodontium and the temporomandibular joint and the soft tissues, which make up the mucosa that lines the oral cavity. In addition, these products may also affect the other organ systems. Very recently, Kumar et al. (2003) reported sperm head shape abnormality in mouse treated chronically with pan masala plain as well as with tobacco (gutkha) in an experimental study.
Areca nut is one of the hardest nuts and habitual chewers of these products chew 5-25 quids per day, which exerts excessive masticatory load on the teeth. Thus, areca nut chewing may have direct deleterious effects on teeth. The habitual areca nut chewing may lead to severe attrition of incisal and occlusal surfaces, especially wearing away the enamel. The underlying exposed dentin, being softer, wears at an accelerated rate and may cause sensitivity to hot and cold. Extrinsic staining is also common in chewers due to areca deposits particularly in cases with poor oral hygiene. The periodontium may also suffer due to habit of chewing areca nut or tobacco, leading to exacerbation of pre-existing periodontal disease as well as impairment of periodontal reattachment. It is difficult to ascertain the precise biological effects of areca on periodontal health but recent in vitro studies indicate that betel quid chewing exerts a deleterious effect on the gingival tissues (Chang et al. 1998). Thus further studies are necessary to substantiate its harmful effects on these tissues. Although not fully substantiated, it has also been suggested that continuous masticatory stresses generated during habit may cause damage to temporomandibular joint. Although controversial, areca chewing has also been proposed to confer protection against dental caries.

Based on population-based studies conducted mostly in Asia, the role of areca nut along with tobacco in the pathogenesis of oral lesions such as leukoplakia, oral submucous fibrosis is established to some extent. Both leukoplakia and submucous fibrosis are potentially premalignant conditions. According to the annual report of the Population Based Cancer Registry of Ahmedabad Urban Agglomeration Area and Hospital Based Cancer Registry, GCRI for the year 1997, nearly half (48.51%) of all cancer in men and 16.01% of all cancers in women were tobacco related cancers. Out of these oral cavity cancers accounted for 30.90% of all males and for 36.17% of all female tobacco related cancers. At the time of the last review by the International
Agency for Research on Cancer (IARC) in 1985 information available on the carcinogenic role of areca nut was limited. However, data are accumulating on the possible role of areca nut with oral cancer in recent years.

Areca nut chewers are also exposed to some amounts of toxic/essential metals during chewing. The areca nut has been reported to contain appreciable amount of copper as compared to other nuts (Trivedy et al., 1997). Some toxic metals such as cadmium, lead are also present as contaminants in the chewing product such as pan masala (NIOH, 1989). Metals are not biodegradable, have long biological half-lives and have the potential to accumulate in different body organs leading to unwanted side effects. The toxic effects of certain metals in different animal systems are well documented. Higher exposure to these may be toxic to the human. However, zinc and copper are the essential metals required for various physiological functions. Zinc deficiency has been associated with adverse effects in humans and animals; however, overexposure to zinc also has been associated with toxic effects (ATSDR, 1994). Recent researches implicated copper in causation of fibrotic diseases (Britton, 1996). Thus, there is a need to have a base line data on copper level among chewers and non-chewers.

It is difficult to interpret role of areca nut alone in epidemiological studies, as there are several confounding variables such as the level of oral hygiene, dietary factors, general health and dental status, not to mention tobacco smoking, which may have a significant influence on periodontal status as well as other oral lesions.

Keeping in view of the wide spread use of areca nut and tobacco chewing habits around the world especially in Indian subcontinent, availability of commercial chewing products and their use even by teenagers and pregnant women, it is necessary to look for effects of various chewing habits on oral mucosa as well as on hard tissues. Thus, the present study has been
conducted to find out the association between oral status with the chewing habits and also the genotoxic potential of these substances by studying the micronuclei in buccal mucosa. The broad objectives of the study are:

1. To compare the clinical condition of oral cavity including periodontal health and hard tissue status of chewers and non-chewers.
2. To study the genotoxic potential of these substances by studying micronuclei in the buccal mucosal cells.
3. To determine the copper and zinc level in the saliva and serum of chewers and non-chewers.

In addition attempt has also been made to study the immunoglobulin levels among chewers and non-chewers in a representative number of samples as it has been reported that IgA and IgG levels are lowered among smokers (Anderson et al. 1982; Moszczynski et al. 1989a, b, c; Mili et al. 1991; Moszczynski et al. 2001). Some information on the actions of betel nut or its constituents on immune system is also available. Sharan (1996) mentioned in his review that betel nut or its constituents might induce suppression of phagocytic functions, reduced antibody formation and delayed hypersensitivity response. However, data pertaining to immunoglobulin levels in serum of among smokeless tobacco or areca nut chewers are lacking/scanty.

The results of this study might be useful in raising the interest of health-care professionals, researchers, health advisers and to some extent to the community. Intervention programme such as information, education and communication about the ill effects of these habits may be of significance after putting the facts about the effects associated with these habits.