

**BIOCHEMICAL CHANGES IN BETEL QUID CHEWERS AND NON-CHEWERS OF KAKKARAI, THANJAVUR DISTRICT OF TAMILNADU**

RAMYA M, ANURADHA R\*

Department of Biochemistry, Sengamala Thayaar Educational Trust Women's College, Sundarakkottai, Mannargudi - 614 016, Tiruvarur, Tamil Nadu, India. Email: mathianuradha@gmail.com

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**ABSTRACT**

Betel quid (BQ) chewing is ancient, socially acceptable habit in India. A mixture of betel leaf, areca nut, and tobacco chewing is used in many parts of India. The aim of our study is to assess the biochemical changes of a mixture of betel leaf, areca nut, and tobacco users. A total of 25 male patients aging  $\geq 45$  years. Among them 5 had no habit of chewing betel quid with or without tobacco and 20 possessed the habit for BQ chewing. A significant difference in biochemical levels among control and chewers. The level of plasma glucose, serum enzymes such as alanine aminotransferase, aspartate aminotransferase, alkaline phosphatase, serum cholesterol, high-density lipoprotein cholesterol, triglycerides urea, and creatinine were found to be increased and the protein level was decreased chewers when compared to non-chewers. BQ chewing is significantly associated with a variety of health problems liver marker enzymes, renal marker, lipid profile, glucose in the present study.

**Keywords:** Betel quid chewers, Non-chewers, Biochemical analysis.**INTRODUCTION**

Oral mucosa response in different ways to quid. Quid is a substance or mixture of substances that is placed in the mouth, where it is sucked or actively chewed and thus remains in contact with the mucosa over an extended period. It usually contains one or both of 2 basic ingredients, tobacco, and areca nut [1]. A variety of oral mucosal lesions and conditions have been reported in association with quid and tobacco use [1,2]. Quid are classified into three basic categories: (1) Quid with areca nut without tobacco products (pan or betel quid [BQ]), (2) Quid with tobacco products without areca nut (chewing tobacco, moist, and dry snuff), (3) Quid with both areca nut and tobacco products (gutkha) [3]. The specific components of this product vary between communities and individuals.

The BQ or pan is a mixture of areca nut (areca catechu), catechu (acacia catechu), slaked lime (calcium oxide and calcium hydroxide) and several condiments according to taste, wrapped in a betel leaf (piper betle). Pan placed between the teeth and the buccal mucosa and is gently chewed or sucked over a period of several hours [1,4]. The slaked lime acts to release an alkaloid from the areca nut, which produces a feeling of euphoria and well-being [5]. Other substances of local preference may be added, such as grated coconut or a variety of spices, for example, aniseed, peppermint, cardamom, and cloves [6]. Variants of pan include use of sliced areca nut alone and addition of sweeteners to make the product particularly attractive to younger children, to whom it is sold under the names sweet supari, gua, mawa or mistee pan. Other variants such as kiwam, zarda, and mitha pan (also known as gutkha) may contain a variety of substances, including tobacco [4,7].

In India, most habitual chewers of BQ add tobacco. Tobacco may also be used as a component of paan is called as gutkha. This product is basically a flavored and sweetened by a mixture of areca nut, catechu, and slaked lime with tobacco; this usage of gutkha is more carcinogenic and associated with oral diseases. The product is basically a flavored and sweetened dry mixture of areca nut, catechu, and slaked lime with tobacco (gutkha) or without tobacco (pan masala) [1]. These products have been strongly implicated in the recent increase in the incidence of oral submucous fibrosis (OSF), especially in the very young, even after a short period of use. This precancerous lesion, which has a high rate of malignant transformation is extremely debilitating and has no known cure. The use of tobacco with lime, BQ with tobacco, BQ

without tobacco, and areca nut have been classified as carcinogenic to humans [3]. Increase in oral cancer among the young due to increased consumption of the alternative chewing products gutkha and pan masala. Pan masala and gutkha have become very popular with all sections of Indian society, including school children. For most children, teenagers, and women, cigarette smoking still remains taboo in India.

Smokeless tobacco is a method of intraoral application and represents a non-homogenous group of compounds [8]. The term smokeless tobacco also known as dip, plug, chew or spit tobacco, refers to both chewing tobacco (coarse cut) and snuff (fine cut) [9]. Three types of smokeless tobacco are commonly manufactured: Loose-leaf chewing tobacco, moist snuff, and dry snuff [10]. Tobacco products which were usually consumed by a small section of the population are today part of the modern urban and rural lifestyle.

**Oral mucosal lesions and conditions**

Habit of chewing or holding of pan masala and gutkha in the oral cavity - allows absorption of nicotine and other carcinogens through oral mucosa. Orally absorbed nicotine also stays longer in the blood stream. As an early sign of damage to the oral mucosa, chewers of BQ with or without tobacco often develop clinically visible whitish (leukoplakia) or reddish (erythroplakia) lesions and/or stiffening of the oral mucosa and OSF. Quid-related lesions should be categorized conceptually into two categories: first, those that are diffusely outlined and second, those localized at the site where a quid is regularly placed. Additional or expanded criteria and guidelines were proposed to define, describe or identify lesions such as chewer's mucosa, areca nut chewer's lesion, OSF, and other quid-related lesions. A new clinical entity, betel-quid lichenoid lesion, was also proposed to describe an oral lichen planus-like lesion associated with the BQ habit.

**Betel chewer's mucosa**

Betel chewer's mucosa is a condition of the oral mucosa in which, because of either direct action of the quid or the traumatic effect of chewing (or both), there is a tendency for the oral mucosa to desquamate or peel. Loose and detached white tags of tissue can also be seen and felt [1]. The underlying areas assume a pseudomembranous or wrinkled appearance.

### Quid-induced lesion

A quid-induced lesion is a localized lesion of the oral mucosa corresponding to the regular site of placement of quid. It is characterized by one or more of the following characteristics: change in color, wrinkled appearance, thickening of the mucosa, scrapable or non-scrapable epithelial surface, and the presence of ulceration [1].

### Areca-nut-related lesion

Areca nut chewers, like chewers of other kinds of quid, may have clinically healthy mucosa with no textural or color changes. However, the buccal mucosa, either bilaterally or unilaterally, may show an ill-defined whitish gray discoloration that cannot be rubbed off [1]. In addition, the mucosa may show a rough, linen-like texture, and histologic examination reveals orthokeratinized or parakeratinized epithelium.

### BQ lichenoid lesion

A quid-induced lichenoid oral lesion has been reported exclusively among users of BQ [11]. It resembles oral lichen planus, but there are certain specific differences. The quid-induced lesions is characterized by the presence of fine, white, wavy, parallel lines that do not overlap or criss-cross, are not elevated and in some instances radiate from a central erythematous area. The lesion generally occurs at the site of placement of the quid. This lesion was originally described as a lichen planus-like lesion, but it is now termed a betel-quid lichenoid lesion [1]. This lesion may regress with a decrease in the frequency or duration of quid use or a change in the site of placement of the quid. There may be complete regression if the quid habit is given up.

Therefore, the purpose of this study are:

- To estimate the effect of BQ chewing with or without tobacco on plasma glucose.
- To analyze the effect of BQ on biochemical markers and the hepatic marker enzymes aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase (ALP).
- To evaluate the effect of BQ chewing on the level of lipid profile and the renal markers such as urea and creatinine.

### METHODS

The present study was carried out in Biochemical Laboratory of STET women's college Mannargudi. 30 BQ chewers of Kakkurai, Thanjavur district, were chosen for the present study. The subjects were male ranging in age from 50 to 60 years. All patients were subjected to biochemical investigation.

### Collection of blood

The blood samples were collected in bidi smokers by a venous puncture in a heparinized tube. Serum and plasma were separated by centrifugation at 3000 rpm for 15 minutes. The separated plasma serum was used for the investigation. Biochemical parameters were analyzed on semi auto analyzer (Chem- 5 Plus v2 model) using standard kits supplied by Erba. Glucose [12], cholesterol oxidase- phenol + aminophenazone (PAP) method [13], high-density lipoprotein (HDL)-cholesterol [14], triglycerides GPO-PAP method [15], serum glutamate Oxaloacetate Transaminase, and Serum Glutamate Pyruvate Transaminase [16], Alkaline Phosphatase were analyzed by IFCC Method [17], and Total protein by Biuret method [18], Urea by urease method [19], and Creatinine [20].

### Statistical analysis

All the data were expressed in mean  $\pm$  standard deviation.

### RESULTS AND DISCUSSION

BQ, areca nut chewing has extensively studied in many parts of the world. Chewing a mixture of BQ, areca nut, and tobacco is a complex behavior and is poorly studied. The purpose of this study was to comparatively estimate the biochemical parameters of BQ chewers (smokeless tobacco) with their respective controls. In the present study, biochemical changes in BQ chewers when compared non-chewers were presented in Table 1.

**Table 1: Biochemical analysis of BQ chewers**

Serial number	Parameters	Non-chewers	Chewers
1	Glucose (mg/dl)	96.22 $\pm$ 3.08	172.64 $\pm$ 27.0
2	Cholesterol (mg/dl)	186.05 $\pm$ 2.01	309.61 $\pm$ 4.90
3	HDL-cholesterol (mg/dl)	52.28 $\pm$ 2.08	18.12 $\pm$ 0.86
4	Triglyceride (mg/dl)	37.72 $\pm$ 1.07	172.65 $\pm$ 26.80
5	AST (IU/L)	18.12 $\pm$ 0.86	38.66 $\pm$ 1.08
6	ALT (IU/L)	25.43 $\pm$ 1.66	45.63 $\pm$ 6.73
7	ALP (IU/L)	38.66 $\pm$ 1.08	96.22 $\pm$ 3.08
8	Total Protein (g/dl)	6.8 $\pm$ 0.1	4.8 $\pm$ 0.4
9	Urea (mg/dl)	15.47 $\pm$ 0.27	54.68 $\pm$ 5.46
10	Creatinine (mg/dl)	1.66 $\pm$ 0.33	2.23 $\pm$ 0.30

Values are expressed as mean $\pm$ SD, n=30, ALT: Alanine aminotransferase, AST: Aspartate aminotransferase, ALP: Alkaline phosphatase, HDL: High-density lipoprotein, SD: Standard deviation

The plasma glucose, serum enzymes such as AST, ALT, ALP; lipid profile such as triglycerides, total cholesterol, renal markers of urea, and creatinine level were increased and the level of protein, HDL-cholesterol were decreased in BQ chewers when compared to non-chewers.

### CONCLUSION

Analysis was carried out on studies of BQ chewing with tobacco in Kakkurai, Thanjavur district, in relation to health risks. A direct association was detected, though the results were less convincing. Furthermore, betel chewing may impose a greater risk than smoking. More effort on developing betel chewing cessation programs is urgently warranted. Further studies are needed to elucidate whether similar effect is present for different groups of diseased patients and the mechanisms of the effect of chewing tobacco and BQ on the occurrence of health problems, has to be worked out in molecular levels.

### REFERENCES

1. Zain RB, Ikeda N, Gupta PC, Warnakulasuriya S, van Wyk CW, Shrestha P, *et al.* Oral mucosal lesions associated with betel quid, areca nut and tobacco chewing habits: Consensus from a workshop held in Kuala Lumpur, Malaysia, November 25-27, 1996. *J Oral Pathol Med* 1999;28(1):1-4.
2. Yang YH, Lee HY, Tung S, Shieh TY. Epidemiological survey of oral submucous fibrosis and leukoplakia in aborigines of Taiwan. *J Oral Pathol Med* 2001;30(4):213-9.
3. Avon SL. Oral mucosal lesions associated with use of quid. *J Can Dent Assoc* 2004;70(4):244-8.
4. Farrand P, Rowe RM, Johnston A, Murdoch H. Prevalence, age of onset and demographic relationships of different areca nut habits amongst children in Tower Hamlets, London. *Br Dent J* 2001;190(3):150-4.
5. Neville BW, Damm DD, Allen CM, Bouquot JE. *Oral and Maxillofacial Pathology*. 2<sup>nd</sup> ed. Philadelphia: W.B. Saunders Company; 2002. p. 349-50.
6. International Agency for Research on Cancer. IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans. Tobacco habits other than smoking; betel-quid and areca-nut chewing; and some related nitrosamines. Vol. 37. Lyon, France: IARC; 1985. p. 291.
7. Shah B, Lewis MA, Bedi R. Oral submucous fibrosis in a 11-year-old Bangladeshi girl living in the United Kingdom. *Br Dent J* 2001;191(3):130-2.
8. Glick M, Ship J. *Burket's Oral Medicine*. 11<sup>th</sup> ed. Hamilton: BC Decker; 2008. p. 100-1.
9. Gupta J, Gupta KK, Samadi FM, Kabiraj A. Smokeless tobacco and oral cancer – A review. *Indian J Oral Sci* 2012;3(2):74-8.
10. Warnakulasuriya KA, Ralhan R. Clinical, pathological, cellular and molecular lesions caused by oral smokeless tobacco – A review. *J Oral Pathol Med* 2007;36(2):63-77.
11. Daftary DK, Bhonsle RB, Murti RB, Pindborg JJ, Mehta FS. An oral lichen planus-like lesion in Indian betel-tobacco chewers. *Scand J Dent Res* 1980;88(3):244-9.
12. Trinder P. Determination of glucose in blood using glucose oxidase with an alternative oxygen acceptor. *Ann Clin Biochem* 1969;6:24-5.

13. Siedel J, Hägele EO, Ziegenhorn J, Wahlefeld AW. Reagent for the enzymatic determination of serum total cholesterol with improved lipolytic efficiency. *Clin Chem* 1983;29(6):1075-80.
14. Burstein M, Scholnick HR, Morfin R. Rapid method for the isolation of lipoproteins from human serum by precipitation with polyanions. *J Lipid Res* 1970;11(6):583-95.
15. Jacobs NJ, Van Denmark PJ. The purification and properties of the  $\alpha$ -glycerophosphate oxidizing enzyme of *Streptococcus faecalis* 10C1. *Arch Biochem Biophys* 1960;88:250-5.
16. Tietz NW, editor. *Text Book of Clinical Chemistry*. Philadelphia, PA: WB Saunders; 1986. p. 579.
17. Demetriou JA, Drewes PA, Gin JB. Enzymes in clinical chemistry. In: Henry RJ, Cannon DC, Winkelman JW, editors. *Principles and Technics*. 2<sup>nd</sup> ed., Vol. 34. Harper & Row, Hagerstown, Maryland; 1974. p. 879-88.
18. Bessey OA, Lowry OH, Brock MJ. A method for the rapid determination of alkaline phosphates with five cubic millimeters of serum. *J Biol Chem* 1946;164:321-9.
19. Kassirer JP. Clinical evaluation of kidney function – Glomerular function. *N Engl J Med* 1971;285:385-9.
20. Bowers LD, Wong ET. Kinetic serum creatinine assays. II. A critical evaluation and review. *Clin Chem* 1980;26:555-61.