

Hapticophagia in Iron Deficiency Anaemia and Oral Submucous Fibrosis- Two Sides of the Same Coin

P POORNACHITRA¹, ARVIND MUTHUKRISHNAN²**Keywords:** Areca catechus, Betel nut, Oral cancer

Dear Editor,

Oral Submucous Fibrosis (OSF) is a well recognised Oral Potentially Malignant Disorders (OPMD) that is primarily attributed to areca nut chewing in raw form or commercial preparations. Areca nut is also an independent risk factor for developing oral cancer. The worldwide rate of malignant transformation from OSF is 2.3%-7.6%; in India, the potential malignant transformation rate is 7% to 30% [1]. Arecanut is a psychoactive substance whose alkaloids (arecoline, arecaidine, guvacoine, and guvacine) modulate the autonomic nervous system by transiently amplifying sympathetic activity and gradually reducing vagal action [2]. Among nitrosamines produced by alkaloids in the oral cavity, methylnitrosaminopropionitrile is the most carcinogenic [3]. The lesser known factors in the commencement of the chewing habit in rural areas are its usage in local indigenous native medicine which eventually creates dependency over a period of time. Areca nut is used as remedies for halitosis and digestive disorders and as a deworming agent [4]. In rural areas of India, Areca nut and betel leaves are used to cure indigestion during pregnancy and combat postpartum depression [5]. Recent ethnopharmacological studies have discovered that the hydroalcoholic extract from areca nut inhibits bradykinin which induces extravasation of plasma proteins in dura mater [6,7]. This property might possibly be a reason for being used as a remedy for migraine attacks.

The physiology of craving to fathom the dependence on areca nut chewing must be understood. The food cravings originate in the hippocampus, the memory center, and nucleus accumbens, the pleasure centre, are an interplay of an imbalance of neuropeptides such as dopamine, serotonin, and leptin with endorphins released after chewing the craved item which mirrors the pathway of addiction [8,9]. Interestingly, in Iron Deficiency Anaemia (IDA), there do exist cravings for pica (allotriophagia), corn starch (amylophagia), and ice (pagophagia) which have been well-documented. Hapticophagia or tactile chewing cravings is now a recognised phenomenon observed in IDA wherein, the individuals crave for mastication of hard items to repeal the neurocognitive effects of deficient dopamine and excess Monoamine Oxidase (MAO) [10] that gets corrected with iron repletion. Dopamine modulates sleep, mood, attention, behaviour, motivation, and working memory and MAO is responsible for the disintegration of dopamine, norepinephrine, and serotonin [11].

World Health Organisation (WHO) has declared anaemia as a global health problem with nutritional deficiency. Recent evidence recommends that serum iron and haemoglobin assessment should be done in OSF patients during initial diagnosis and treated simultaneously if deficiency prevails [12,13]. Pica or allotriophagia [14], the craving and compulsive consumption of non food substances, and desiderosmia [15], the olfactory cravings are established manifestations of IDA that get cured with iron replacement therapy. Hapticophagia or tactile chewing cravings is now a proposed symptom with IDA that includes a variety of items namely ginseng, pickles, sawdust, chips, popcorn, crackers, chewing gum, and dry

oats [15]. Hence, it could be credent to also consider IDA as one of the predisposing factors for incipience of areca nut chewing.

It is, therefore, necessary to broaden the tunnelled vision to the fact that malnutrition in individuals of low socio-economic groups that precipitates IDA may initiate hapticophagia and areca nut becomes an easily accessible product among their fraternity to feed their cravings in occupations like drivers and migrant workers. Hence, it must be mandatory for areca nut chewers irrespective of clinical presentation, to be screened for IDA and the findings must be taken into the equation in formulating habit cessation strategies as a personalised recuperative approach. For arriving at the diagnosis of IDA, the American Society of Haematology (ASH) and the British Society of Haematology (BSH) [16] and the BSH [17] recommend the Complete Blood Count (CBC) or Full Blood Count (FBC). Also, understanding the pathophysiology of IDA in men is still nascent, which needs to be explored as areca nut chewers have a male predilection.

The current rehabilitation protocols are structured based on a limited behavioural understanding of the chewers and hence, consuming arecanut after a period of cessation is quite common. Future research pursuits should focus on devising non pharmacological rehabilitation methods among addicts of areca nut beyond conventional counselling or drug therapy. The hapticophagia mechanism can be configured with alternative hard chewable items like ice chips or hard candies that can trigger the common neural circuitry of the reward system. This intervention will motivate them to the path of recovery as an adjunct in assisted habit cessation protocol. These chewable replacements should be edible and be fortified with iron as a micronutrient powder in standardised commercial preparations as a supportive supplementation, if IDA management is also required. This tactile chewing on healthy food derivatives not only combats micronutrient deficiency but also, plummets areca nut cravings with rejuvenated homeostasis, leading to the prevention of OSF and its progression to oral squamous cell carcinoma.

REFERENCES

- [1] Bari S, Metgud R, Vyas Z, Tak A. An update on studies on etiological factors, disease progression, and malignant transformation in oral submucous fibrosis. *J Cancer Res Ther.* 2017;13:399-405.
- [2] Chu NS. Effects of Betel chewing on the central and autonomic nervous systems. *J Biomed Sci.* 2001;8:229-36.
- [3] Boucher BJ, Mannan N. Metabolic effects of the consumption of Areca catechu. *Addict Biol.* 2002;7:103-10.
- [4] Prabhu RV, Prabhu V, Chatra L, Shenai P, Suvarna N, Dandekeri S. Areca nut and its role in oral submucous fibrosis. *J Clin Exp Dent.* 2014;6:e569-75.
- [5] Jain N, Sharma V, Ramawat KG. Therapeutic potentials of medicinal plants traditionally used during postpartum period and their molecular targets. *Journal of Ecobiotechnology* 2011;3(x):xx-xx.
- [6] Bhandare A, Kshirsagar A, Vyawahare N, Sharma P, Mohite R. Evaluation of anti-migraine potential of Areca catechu to prevent nitroglycerin-induced delayed inflammation in rat meninges: Possible involvement of NOS inhibition. *J Ethnopharmacol.* 2011;136:267-70.
- [7] Bhandare AM, Vyawahare NS, Kshirsagar AD. Anti-migraine effect of Areca Catechu L. nut extract in bradykinin-induced plasma protein extravasation and vocalization in rats. *J Ethnopharmacol.* 2015;171:121-24.

- [8] Ahima RS, Antwi DA. Brain regulation of appetite and satiety. *Endocrinol Metab Clin North Am.* 2008;37:811-23.
- [9] Volkow ND, Wang G-J, Baler RD. Reward, dopamine and the control of food intake: implications for obesity. *Trends Cogn Sci.* 2011;15:37-46.
- [10] Scheckel CJ, Yanardag Acik D, Ravindran A, Marshall A, Go R. Hapticophagia: Tactile chew cravings in iron deficiency anaemia. *Am J Hematol.* 2020;95:E107-08.
- [11] Jones DN, Raghanti MA. The role of monoamine oxidase enzymes in the pathophysiology of neurological disorders. *J Chem Neuroanat.* 2021;114:101957.
- [12] Karthik H, Nair P, Gharote HP, Agarwal K, Ramamurthy Bhat G, Kalyanpur Rajaram D. Role of hemoglobin and serum iron in oral submucous fibrosis: A clinical study. *Scientific World Journal.* 2012;2012:254013.
- [13] Bhardwaj D, Dinkar AD, Satoskar SK, Desai SR. Serum iron and haemoglobin estimation in oral submucous fibrosis and iron deficiency anaemia: a diagnostic approach. *J Clin Diagn Res.* 2016;10:ZC54.
- [14] Borgna-Pignatti C, Zanella S. Pica as a manifestation of iron deficiency. *Expert Rev Hematol.* 2016;9:1075-80.
- [15] Hansen BR, Bottner WA, Ravindran A, DeJesus R, Go RS. A follow-up on desiderosmia (olfactory craving), a novel symptom associated with iron deficiency anemia. *Am J Hematol.* 2017;92:E546.
- [16] Ning S, Zeller MP. Management of iron deficiency. *Hematology Am Soc Hematol Educ Program* 2019;2019:315-22.
- [17] Bouri S, Martin J. Investigation of iron deficiency anaemia. *Clin Med.* 2018;18:242-44.

PARTICULARS OF CONTRIBUTORS:

1. Postgraduate Student, Department of Oral Medicine and Radiology, Saveetha Dental College and Hospital, Chennai, Tamil Nadu, India.
2. Professor and Head, Department of Oral Medicine and Radiology, Saveetha Dental College and Hospital, Chennai, Tamil Nadu, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Arvind Muthukrishnan,
162, Poonamallee High Road, Velappanchavadi, Chennai-600077, Tamil Nadu, India.
E-mail: arvindmuthukrishnan@yahoo.com

PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: Mar 07, 2023
- Manual Googling: Apr 07, 2023
- iThenticate Software: Apr 22, 2023 (4%)

ETYMOLOGY: Author Origin**AUTHOR DECLARATION:**

- Financial or Other Competing Interests: None
- Was informed consent obtained from the subjects involved in the study? NA
- For any images presented appropriate consent has been obtained from the subjects. NA

Date of Submission: **Feb 22, 2023**Date of Peer Review: **Mar 29, 2023**Date of Acceptance: **Apr 24, 2023**Date of Publishing: **Jun 01, 2023**