



Dohra- a mixture of potent carcinogens

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Background & objectives: *Dohra* is a areca nut preparation used with or without tobacco in a few of the areas of Uttar Pradesh (UP), India. There is evidence that it causes potentially malignant disorders and oral cancer. This study was undertaken to provide information on *dohra* by searching through literature and also through a survey in three areas of Uttar Pradesh (UP), India.

Methods: The information on *dohra* was collected through literature search, study tour to different areas of UP, where group discussions with *dohra* vendors and with community members of different age group were done to obtain information.

Results: *Dohra* was prepared by the users for their personal use or prepared by small-scale industry for sale. It was available mostly in betel shops or any other store/kiosks and was also available in special *dohra* shops. *Dohra* was available in both dry and wet form. Its common constituents were areca nut, catechu (*Acacia catechu*), edible lime, peppermint (*Mentha piperita*), cardamom (*Elettaria cardamomum*) and some flavoring agents. *Dohra* was consumed as such or with tobacco.

Interpretation & conclusions: Different varieties of *Dohra* were available such as *sukha dohra*, *sukha mulethi dohra* and *geela dohra*. Different processing methods for producing *dohra* existed. As *dohra* increases the risk of cancer, it needs to be banned or it should be sold in packets with the details of its constituents and also statutory warning about its adverse health effects.

Key words Areca nut - catechu - *Dohra* - edible lime - tobacco

Dohra is a mixture of areca nut (*Supari*), catechu (*Katha*), edible lime, peppermint, cardamom (*Illayachi*) and some flavoring agents^{1,2}. It is being used with and without tobacco in a few areas of Uttar Pradesh (UP), India and sold in the market without any brand name.

There are evidence that chronic use of this product is a major risk factor of oral submucous fibrosis (OSF) in the younger age group³ which might later progress to oral cancer (OC). Till date, major aspects related to *Dohra* i.e. varieties, its constituents, processing of the

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products, marketing, price, storage and its use have not been studied. Since it is associated with potentially malignant disorders (PMD) and OC, this study was aimed to give details on *dohra* through (i) gathering information through study tour to different areas of Uttar Pradesh (UP), where group discussions with *Dohra* vendors and with community members of different age group were done, and (ii) collecting information through literature search.

Material & Methods

The information on *Dohra* was collected through study tour to three different areas of UP, *i.e.*, Jaunpur, Allahabad and Pratapgarh by group discussions with *Dohra* vendors, and with community members of different age groups.

Literature search: The screening of studies was performed on PubMed databases (since inception) and Google on November 13, 2017. A total of 53 studies were obtained from PubMed using the phrase '*dohra*' of which only two studies were found relevant^{3,4}. These studies had minimal information on the association of this product with OSF. In addition, all the 19 available pages of Google were screened using the word '*dohra* tobacco', which gave additional three studies^{1,5,6} (Figure).

Inclusion & exclusion criteria: Studies on *dohra* or studies which found any parameter related to *dohra* were included in the study. The studies not having any description/mention of *dohra*, and those published in languages other than English were excluded.

Results & Discussion

During the survey in UP it was found that *dohra* was consumed and available in different areas of Eastern UP and prepared by the user for their personal use or prepared by small-scale industry for sale. The product was wrapped and sold in the recycled plastics and may be used as such or with tobacco. It was available mostly in betel shops or any other store/kiosks and was also available in special *dohra* shops. It was available in both dry and wet forms. The shelf life of wet *dohra* was only a few days while the dry *dohra* could be consumed for months.

Of the five studies found on *dohra*, only two were on the association of *dohra* with OSF^{3,4}. The consumption of *dohra* was very frequent in areas of UP. The study by Ansari *et al*⁵ in Eastern UP population, found that 4.73 per cent (14/296) individuals consumed *dohra* among whom majority were in an age group of 20-29 years.

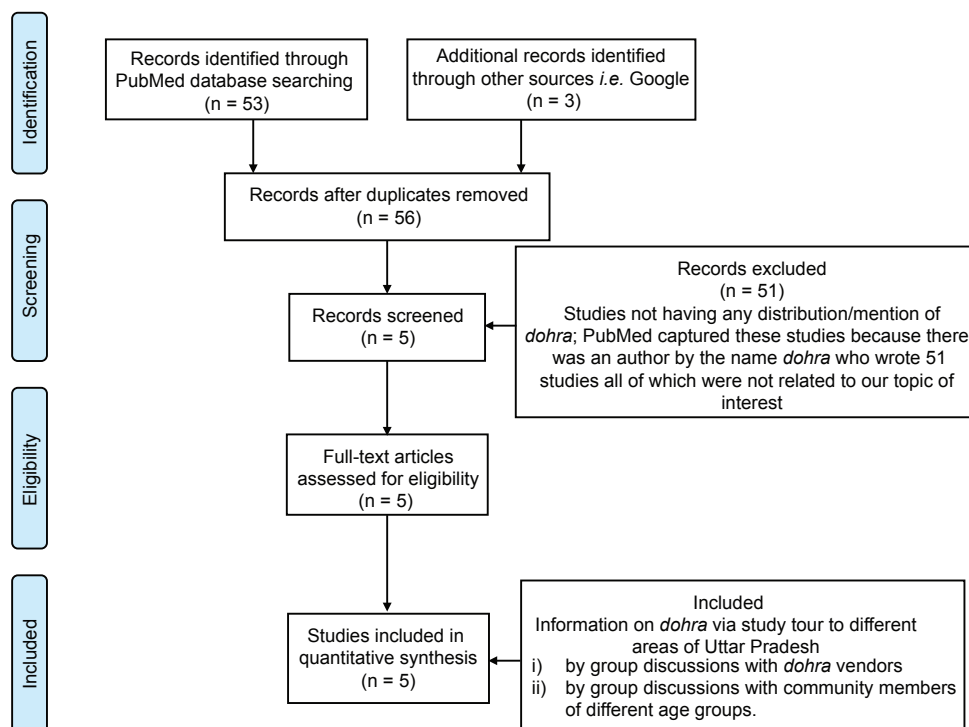


Figure. Flowchart describing the included/excluded literature.

Dohra was found to be produced and sold in three major districts of Eastern UP, India, *i.e.*, Jaunpur, Allahabad and Pratapgarh^{1,6,7}. The major localities in Jaunpur and nearby regions where *dohra* was produced and/or sold included Jaunpur city, Shahganj, Mariahu, Machhali Shahar, Kerakat, Badlapur, Mungra Badshahpur, Kheta Sarai, Muftiganj, Rampur, Nauperwa, Singramau and Shambhuganj. In Allahabad, *dohra* was produced and/or sold in almost all the localities; however, the major localities comprised Daraganj, Kydganj, Mutthiganj, Ahiyapur, Meerapur, Mausamganj, Gaughat and Kalyanidevi. It was also available in the locations nearby Allahabad such as Naini, Mirzapur, Fatehpur, Khaga and Kaushambi. *Dohra* in Pratapgarh was found to be sold in a locality named *Chowk*. The nearby locations where it was available were Kunda, Babuganj Bazar and Patti.

Varieties of dohra: The *dohra* of Jaunpur and Pratapgarh was of one variety, *i.e.*, wet *dohra* whereas *dohra* of Allahabad was of two major varieties *i.e.* 'sukha sada dohra', which was not sweet in taste, and 'sukha meetha mulethi dohra' which was slightly sweet in taste. There were other less common varieties such as 'Chandan ka dohra', 'Santare ka dohra', 'Tal makhana ka dohra', 'Zaifer aur javitri ka dohra' (sold in winter), *etc.*

Processing of dohra: The *dohra* from Jaunpur, Allahabad and Pratapgarh varied in their processing; however, the processing done in either 'homemade dohra' or in 'dohra from small-scale industries' within these districts was similar.

Jaunpur: The main constituent of *dohra* was areca nut. For the preparation, areca nut was first peeled off and soaked in a utensil for three days⁸. After that, it was soaked in edible lime water, followed by cutting it into thick slices. The reason behind soaking areca nut in water was to reduce the time and cost of cutting. Once the areca nut was cut down into thick slices clove powder, cardamom powder, peppermint and some other flavouring agents were added and mixed properly with hand. In the past, people were also using mountainous catechu (*Pahari Katha*) in *dohra*; however, these days, it was hardly used by the *dohra* vendors. Since different traders used variable quantities of ingredients for *dohra* preparation, therefore, there was no standard composition of *dohra*. *Dohra* from Jaunpur was sold without any tobacco, however, consumers add different types and quantity of tobacco according to their wish and taste.

Allahabad: The *dohra* of Allahabad was different from that of Jaunpur and Pratapgarh, as it was a dry product. For making *dohra* different varieties of areca nut were used. The areca nut was peeled and cut into thin slices. In the next step, edible wet lime and dry catechu was added to areca nut and the components were once again properly mixed with hands until it attained dark red or brownish colour. Once that stage was reached clove powder and cardamom powder were added and the resultant mixture was again thoroughly mixed. Finally, peppermint was added to the resultant mixture and final mixing was performed to complete the *dohra* preparation. Some people also used some flavouring agents to give different taste to *dohra*. Most of the people consumed *dohra* with either processed branded tobacco or locally processed unbranded tobacco leaves.

Pratapgarh: The areca nut was peeled and soaked in water for around a day followed by cutting into small thin slices. The edible wet lime and catechu were mixed with hand until it reached a dark reddish or brownish colour. Later on, peppermint, clove powder and cardamom powder were added to make the *dohra*. Unlike Allahabad, people here consumed *dohra* mostly with unprocessed raw, finely ground tobacco.

Availability & marketing of dohra: *Dohra* was mostly available in betel shops or any other store/kiosks and was also available in special *dohra* shops. It was being sold in small plastic packets. Usually, the vendor prepared different sizes of packets and sold them according to weight which usually costed ₹ 5, 10, 20 or 50. It was also sold with a rate of around ₹ 500/kg in Jaunpur, ₹ 1200/kg in Allahabad for both varieties of 'dry dohra' and ₹ 800/kg in Pratapgarh.

Health warnings on dohra: The *dohra* does not contain any statutory warning label in the form of sign(s) or picture(s) or written warnings, and hence, the consumers are unaware of the harmful health hazards of the product, leading to higher consumption of the product by the consumers. People prefer to consume *dohra* than *gutka* (a form of smokeless tobacco product) considering it to be harmless since there are no warnings.

Addiction due to dohra: The *dohra* is a product which contains a potent carcinogen in the form of areca nut^{9,10}. *Dohra* is mostly consumed with tobacco, which is also a well-known carcinogen¹¹. Around 80-90 per cent of the people consume *dohra* with tobacco and the rest use without tobacco. Continuous consumption

of this product tends to make people addicted to it and difficult to quit.

Impact of dohra on human health: Consumption of dohra leads to oral submucous fibrosis which is a commonly known condition in tobacco chewers as well^{5,12}. It decreases the salivary secretion (xerostomia), causes dental problems (stained teeth, periodontitis), digestive system problems and intestinal cancer¹³.

In conclusion, the dohra was found to be produced, consumed and sold in the Eastern UP. Different varieties of dohra existed such as dry dohra (*sukha dohra*), dry mulethi dohra (*sukha mulethi dohra*) and wet dohra (*geela dohra*). Different processing methods were being used for producing dohra. More studies on this product need to be undertaken. As this product increases the risk of cancer, it needs to be completely banned. If not, at least, the product should be sold in a packet with statutory warning sign and proper details of constituents it contains, so that the consumers are aware of its adverse impact on their health.

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Conflicts of Interest: None.

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