

Traditional food for mitigating food and nutritional security in Western India

during harsh period

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India is endowed with diverse climatic conditions which renders all sorts of crops. Despite, huge production of food grains, a significant population faces hunger crisis. There is several harsh situations lead to severity of such crisis of food. Ultimately, this leads to malnourished population in the country. As per the report of UNICEF, 2019, in India on an average 69% of children die below five due to malnutrition. Several factors like drought, hailstorm, crop failure and any pandemic disease are responsible. Recently, a pandemic disease due to corona virus (COVID 19) caused severe crisis especially for daily paid labours and slums. Our traditional preserved foods and consumption methods could mitigate such hunger crisis, and can overcome the challenges of nutritional security during these days. Their traditional uses are well established and understood but that is confined to rural areas only. In this paper, the medicinal and nutraceutical properties of traditional food are explored. The importance of such food required attention under crisis and resource limit conditions and during such pandemic like outbreaks.

Key words: Food security, Millets, Processing, Storage, Traditional food

INDIA produce around 284.83 million metric tonnes of food grain and around 311 MT of horticultural commodities. Out of which are 46.99 MT Nutri-cereals, 112.91 Mt rice, 99.70 MT wheat. However, India is self sufficient in food grain to fulfill the demand of people. In spite of that a significant part of population remains hunger and faces hunger crisis during the adverse days. India was 102 ranked out of 117 Countries in Global Hunger Index that seems to be a very serious issue. With the total score 30.3, it was noticed that India is facing serious challenge of hunger. Every year, Indian farmers faces some outbreaks of environmental maladies like (flood, drought and hailstorm), diseases and pest attack on crops and other stresses. Central government has allotted budget an amount to ₹ 1,510 crores under Centre

sponsored National Food Security Mission in year 2018-19 to meet food for needy people. In 2020, a severe pandemic disease due to novel corona virus (COVID 19) caused thousands of deaths and lockdown of whole World including India. A severe crisis was observed during the shutdown in India. Most of daily wages people, labour class and poor farmers suffered during this period and it was very hard to get resources for daily feed. Under such circumstances, another option of ethnic food system could be a milestone and can fulfill the need and daily requirement of people. Since, ancient time our people in rural areas used to preserve the food materials by traditional methods and use in the adverse days. The use of Bajra, Ragi, Jwar, mixed grains, coarse millets and their processed products were common. Consumption of bajra

in winter gives energy and cure against different remedies. *Khichda*, a product prepared from boiling bajra grains along with rice, jwar and wheat grains is very nutritious and energetic. This is still in practice in rural areas of Rajasthan for banquet and feast during religious matters. Preparation of multigrain *Chapati* (*Missi Roti*) is also a unique for curing different ailments. Some processed products like *Shakarpara* (Cookies from wheat and bajra flour) can be stored upto a month and consumed during drought conditions is very common. *Rabdi* made from Bajra, wheat and barley coarse grains is consumed the next day with milk or curd and also able to cure cough and fever. Dried and roasted form of barley, chickpea, and wheat can be stored for a long time and can be consumed during these days. Epidemiological studies concluded

that whole grain diet is associated with lower risk of heart and cardiovascular diseases. Functional and nutraceutical rich food is demanding of today's consumer. Preservation of leafy vegetables either in the form of dried powder or flakes is more common and generally used in off season. However, this ethnic system is disappearing. Several other products like multigrain papads, *Khisia*, *Laddu*, candy etc. common which can be stored for longer period. Now a day, some local markets are trying to sell such products and helping in their marketing. Products like Dalia, Papad, dried fruits, and vegetables can be seen easily in display boxes of super markets and malls and they are fetching higher price. So, there is urgent need to understand this system and need to be preserve as it may highly beneficial for all line of peoples. Some of the common traditional food items are describing herewith.

Products from food grains

Bajra and wheat grains are very nutritive rich in fibre, fat, proteins and energy. Wheat contains around 12% proteins, 50-55% of carbohydrates and significant amount of fibres. Similarly two types of bajra are consumed in India. Bold seeded, which is known as bajra has little amount of sugar, and another is *Bajri* which is consumed in Western India round the year. This is sweet in taste and light brown in colour. Bajra contains good amount of fibre (11-12%), carbohydrates (60-65%), iron (4-6mg), fat (4-5%) and proteins (10-12%). Total dietary fibre content is higher in pearl millet as compare to others. Similarly, barley can be considered as functional food which is rich in beta glucan a dietary fibre. This reduces risk of gall bladder, heart diseases and many cancers like diseases. It increases palatability and strong digestive system. Millets are good source of phytochemicals other than major nutrients. Jowar and finger millet contains high amount of antioxidants and minerals. They are rich in polyphenolic compounds, dietary fibres. Sawa and Ragi are commonly used at homes in rural areas for kheer

and halwa making. Similarly, major food grain like rice, gram, maize also have good amount of carbohydrates and rich in insoluble fibers. The nutritive value of food grains and their value added products are depicted in Table 1.

Daliya and Rabdi

Daliya is made from pearl millet, wheat or barley by pestling or coarse grinding them into a mortar. This converts whole grain into small pieces. It is tasty and nutritive food, has been prepared since long back in rural areas. It is said that consuming of bajra dalia can cure cold and fever and give instant relief. *Rabdi* is very common in a household which is prepared by boiling *Daliya* into buttermilk until it get thick consistency. This *rabdi* is consumed with milk or buttermilk on same day even on next day. This *Rabdi* is easily digestible, palatable and considered as lighter food. For health recovery some of medical person recommended *Dalia* and *Rabdi*. *Daliya* can be stored for 10-15 days at room temperature. After that some storage pest may infested. But under vacuum package it can be stored for 3-4 months.

Shakarpara and homemade cookie

Shakarpara is a product that is made from bajra flour by adding jiggery followed by deep frying in

ghee or oil. Dough is prepared by adding jiggery water and small pieces are made as per convenient shape and size. These are sweet in taste and can be consumed for 15-20 days without any spoilage. This product is similar to cookies. Some householders add two-three flours and prepare multiflour shakarpara. This gives better taste than cookies. Children and adult enjoy this *shakarparas* with the tea or solely. Now a days multigrain *shakarpara* are available in market. This can be a good supplement of nutrients in remote areas and during crisis hours.

Choorma and Laddu

This is a popular and old ethnic food prepared during festivals and occasions. Coarse flour is roasted, sieved and mixed with ghee and sugar powder. Both wheat and bajra flour is used to prepare *choorma* laddu. Some people use chapatti by grinding them followed by mixing with ghee and sugar powder. This type of *laddu* is very rich in energy and fat. It is given to pregnant lady as they helps in boosting up energy. It is also rich in phytonutrients and coarse grains are rich in fiber. These foods item can be consumed for longer period of 4-5 months or more than that. Ghee and sugar act as preservatives. Many tribal people prepare and stored them in a stainless steel milkcan kettle or airtight tiffin.



Fig. 1. Bajra and wheat flour based carbohydrate rich value added products

Choorma is consumed directly as dessert after food. *Laddu* are used during breakfasts. During winters, sesame *laddu* is also prepared by adding jaggery which is stimulant, energetic and maintain body temperature.

Multigrain *Tikkad*

This is gaining popularity in Rajasthan especially in arid region. *Tikkad* is basically a form of thick *Chapati* which is prepared by mixing maize, wheat, rice, sorghum, and chickpea flour followed by shallow frying. This is very nutritious as multigrains are there and rich in fibre content and proteins. *Tikkad* is eaten with chutney or veggie. People suffering from diabetic people are also consumed this. Shelf life of this food material is 4-5 days after that it gets too dried and hard thus difficult to consume.

Khichda or *Lapsi*

This is little advance form of *dalia* in which a whole or half grain is boiled until a semisolid product is obtained. This is prepared by bajra/ wheat grains. But now a days people are health conscious and they are mixing many grains like jowar, rice, barley, sesame and many others. This combination of all grains is called *Sattkutt*. *Sattkutt* means mixture of seven grains. It is common on religious occasions especially on Govarhdan pooja in Eastern Rajasthan, Mathura and Western Uttar Pradesh. It is also a combo pack of nutrients, vitamins and other secondary metabolites. The limiting factor is shelf life of this product which is hardly 2 or 3 days. Multigrain breakfast cereal is one of the *Khichda* based concept in which all grains are present.

Roasted grains: *Dhani* and *Bhugda*

Barley is a good functional food and remains important in today's diet. Since many decades, most of the part of barley are using in malting process. Barley grains are rich in dietary fibre, potassium and magnesium. Barley is highly effective against cholesterol, diarrhea, stomach ache and cancer. It is also used to lowering down blood sugar level.



Fig. 2. 'Dhani' prepared from barley is enjoyed round the year

Dhani is roasted barley grain which is highly popular in rural areas during summers (Fig. 2). Roasted barley grain also mixed with water and sugars popularly called as *Sattu* which is drunk during summers to protect against sunstrokes. *Bhugda* are roasted chickpea which is eaten directly and with jaggery which protects against inflammation. It is said that consumption of chickpea with jaggery can cure Jaundice within a week. These roasted grains can be consumed for longer time even more than 6 months. These types of products are now available in small market and *Hatts* which fetches some income as well.

Natural gums and products

There are several sources of natural gums. Gums are extracted from Acacia species (*Acacia senegal*), Cordia myxa, and *Butea monosperma* (locally called as *Khakhra*) (Fig. 3). Natural gums are complex polymers indigestible to human and considered as safe dietary fibre by food and drug administration USA since 1970. These gums are soluble fibres which has several therapeutic, antidiabetic, anti-inflammatory, immunomodulatory and hypoglycemic actions. This is locally used against cardiac complications and renal failure patients. In rural areas, laddu are prepared by adding gums and used

against arthritis and gout related problems in aged people. People of rural areas used to visit forests and collect gums. Several plants like Dhokda, Desi Babool, Dhak and Fog are most common species which produce gum. On the basis of source, the name of gum is decided. Therefore, *Kher gond*, *Kakhra gond*, and *Babool gond* are common names. These gums are also offered to pregnant ladies to protect several diseases as that time is more sensitive. For preparation of laddu, gum are crushed and grounded in fine crystals than roasted in ghee along with flour followed by adding ghee and sugar powder. Dryfruits also added to enhance the taste and organoleptic properties. These laddu and raw gums can be stored for more than a year. Now a day, these natural gums are using as a edible coating material over fresh fruits and vegetables which extended the shelf life upto many days or week and also impart glossiness to fruits.

Papad and *Khisiya*

Khisiya is product which is prepared widely in the Western Rajasthan. This is based on wheat flour which is mixed with buttermilk and a liquid thin material is prepared unlike in case of normal papads. That liquid is dried in the form of *papad* and used after deep frying. The raw

papad (*Khisia*) is used for vegetable purpose when crisis of vegetable occur during off season. They are also sold by the people in local markets, some quality products are also sold by super markets in cities (Fig. 1).

India is a rich basket of coarse millets

Sorghum and other minor millets are the important source of energy, proteins and minerals and are being used as staple food in many African countries as well as many parts of India. Millets are considered as poor man's food. A significant population is depending on millets for their livelihood and food security. India is a top millets producing country. Millets performed well in arid and rainfed climate. Sorghum (Jowar), pearl millet (Bajra), finger millets (Ragi), Kodo millets (Kodu), foxtail millets (Kakum) and little millets (Sawa), etc. are major cultivated millets. People harvest and store them for longer time. Many processed products like millets *Khichda*, *Rabdi*, *Payas* and *laddu* are prepared. Sorghum, pearl millet and finger millets are main crops in Western parts of India, other are cultivated in Tamilnadu, Gujrat, Odisha and many Southern states. The most advantages of these crops are less infestation of diseases and pests and can tolerate a wide range of temperature. Additionally, they are famine food as it can be stored for many years. Millets are considered as functional food because it contain around 60-65% carbohydrates, dietary fiber, polyphenols, tannins, minerals and antioxidants which help in curing age related disorders, hyperglycemia, and many cardiovascular diseases. Majority of millets contain slow releasing starch which helps in slow



Fig. 3. Gum acacia fetches higher price in market

releasing of blood sugar. Bajra and Ragi helps in reducing cancer, stomach ulcers, and celiac diseases. Therefore, in today's market trend and perception of consumer is changing. Now several millets based processed food products are available in the markets which have very high potential to maintain the good health.

Natural diversity of underutilized fruits and vegetables

Indian land is covered with diverse range of fruits and vegetables. Apart from commercial major fruits like mango, banana, citrus, apple, pear and guava, there is a rich diversity of several underutilized and neglected fruit and vegetables. These fruits are called as neglected due to less attention and remain neglected by the people but these fruits have high potential of nutrients and medicinal properties. Many wild fruits are taken into consideration and now starts

cultivation by many research Institutes like CIAH and CAZRI under several AICRP schemes on arid zone fruits. Natural wild diversity of Jharber, Lasoda, Ker, Pilu, Khejri, Karonda, Tendu, Tamarind, Mahua, Khirni and vegetables like Kachri, Kakrol, Kundru, Meetha Karela, Jack bean, Winged bean, Drumstick, Amranthus, Bathua, Poi, Bhawra, Phoot and many other exist in arid part of India (Table 2 and 3). These fruits have potential to mitigate the malnutrition and many other diseases owing to their richness in many secondary metabolites, phenols, antioxidants and bioactive compounds. *Khejri* pods are rich in folic acid, protein, vitamins and considered to be as 'Kalpavriksha of Desert'. *Ker* is a rich source of phenols, iron, vitamin A and ascorbic acid. *Jharber* is richer in protein, phosphorous, calcium, carotene and vitamin C. The unripe fruits are rich sources tannin, is dried, pulverized and used against diarrhea (Fig. 5).

Lasoda fruits are considered as rich sources of antioxidants, minerals, fiber and vitamins, which provides essential nutrients for the human health. *Tendu* helps in stomach disorders, used as carminative and astringent agent and useful in treatment of skin, blood and urinary disease. Likewise, underutilized vegetables also play an important role in livelihood security of marginal farmers in rural and tribal areas. Wild vegetables like amaranths, chenopodium, basella, moringa, winged bean, Kakrol, Kachri, etc., are relatively cheap and available throughout the year. Drumstick is called as multipurpose tree. Its all parts are used in human

Table 1. Nutritional importance and value added products from different food sources

Food	Nutritional importance	Processed and value added products
Wheat	Carbohydrates, dietary fiber, protein	Chapati, laddu, Halwa, Papad, Pudi, Khisia, rabdi, Daliya
Bajra	High protein, niacin and lipids (linoleic & oleic)	Choorma, Laddu, Shakarpara, Cookies, Khichda, Annkut, Satkutta
Jowar	Insoluble fiber, protein, AOX, carbohydrates and low fat	Satkutta, Missi roti, Tikkad
Maize	Sugars, proteins, fat and minerals	Tikkad, boiled grains, flour, Daliya Rabdi
Rice	Energy, protein,	Laddu, Khiliya, Flakes
Chickpea	Proteins, fat, minerals and organic acids	Missi roti, Tikkad, Besan, Pakoras, Shakarpara
Fingermillet	Calcium, sulphur rich amino acids, low fat, dietary fiber	Chapatias, Rabdi, Khichdi, Daliya
Sawa	Protein, dietary fiber and linoleic acid	Kheer, Halwa
Barley	Dietary fiber, energy	Dhaani, malt, Sattu
Dhak & Babool	Polysaccharides, polyphenols, anthocyanin and carotene	Gum extraction, colour extraction

consumption. These are nutritious and contain appreciable amount of vitamins, amino acids, minerals, proteins, antioxidants, secondary metabolites and dietary fibres. People of tribal regions collect these fruits and vegetables from forests, fields and consume at their home. Besides, they also sell these fruits and vegetables in local markets at a very cheaper rate.

Traditional way of processing and value addition

Indigenous people are much smart and have rich knowledge about processing and value addition of fruits and vegetables (Fig. 4). They convert their fresh produce into processed form and stored at ambient temperature for longer time. Drying is very common process in which sufficient moisture is removed from cut fruits and vegetables. Fruits like Jharber, Pilu, Lasoda, Ker, etc., subjected to drying treatment under natural sunlight. Similarly, some leafy vegetables like bathua, Sangari, palak, Choulai, Kachri, Phoot and kakrol cut into pieces and dried for 4-5 days by natural means and stored for longer time. Sometimes, these vegetables are grounded and powdered form is used to prepare vegetables, poodi, Pakora and paranthas round the year. Drumstick is a very good example and now gets commercialized owing to its high nutritional value. Flour of drumstick leaves and pods is distributed in malnourished areas, schools, Anganwadi kendras to combat malnutrition disorders. However, high intensity of light and storage practices are not so sound and may be deteriorate some quality of leafy vegetables. Especially colour



Fig. 4. Traditional vegetables having potential of processing

retention is major concern. Therefore, it is recommended to drying under shade. These dried vegetables like, Kachri, clusterbean Sangri (dried pod of Khejri), kummat, Ker, Phoot, etc. packed in polyethylene pouches and sale in the market which fetches good price. Sometime, flour of sangri, drumstick pods and seeds, ziziphus and phoont is mixed with flour during chapatti preparation.

Panchkutta and Ker-Sangri changed lifestyle

Panchkutta, a vegetable mixture which is prepared from dried fruits of *Ker*, *Kummat*, *Kamal* (Lotus), *Khejri* (*Sangri* pods) and *Kachri*. This is highly popular in Western part of India. This food stuff got popularity country wide and now this is symbol of Marwari culture. In five star restaurants and hotels it fetches

higher price. One serving of panchkutta vegetable along with bajra Chapati and can fetches more than ₹ 300. One packet of panchkutta mixture in malls and super market costs around ₹ 150-200. People who are running restaurants and hotels in Sand dunes of Jaisalmer, Barmer, Bikaner, Jodhpur and other parts of Rajasthan used to offer this dish to tourists. Similarly, Ker-Sangri ki sabji and bajra Roti is also very popular in such areas. It is said that without consuming these two dishes, the journey of *Thar* Desert is incomplete. People collect these vegetables and fruits, dried and packed them. They supply a significant amount of raw material and a surprising change was observed in their life style and status. Now these products get business reputation. We can find these dishes even in metropolitan cities like Delhi, Bombay, Jaipur, etc. Hence, these

Table 2. Different arid zone fruits with their nutritional importance and value added products

Fruits name	Nutritional importance	Processed and value added products
Ber	Proteins, Ascorbic acid, p Hydroxybenzoic, caffeic, ferulic acids	Dried fruits, flour, Chutney, Pickles, Chuhara
Chironji	Good source of ascorbic acid, CHO and oil	Used for fried giri production and oil extraction
Karonda	Iron and carrissone, D-glycoside of â Sitosterol,	Jam, Candy, Pickle and preserve
Ker	2-hydroxyethyl glucosinolate, and carotenoids	Dried fruits, Pickles, Panchkutta
Khejri	Protein, Stigmasterol, Prosophylline, Prosogerin-A like phenols	Dried Pods (Sangri), Powder, Panchkutta, Khokha
Lasoda	Rich source of carbohydrates, sugars and energy	Dried fruits and Pickles
Mahua	Tannic acid, ascorbic acid, protein and oil content	Drinks, Jam and jelly
Pilu	Fluoride and silica, tannins, saponins and flavonoids	Dried fruits and beverages
Tamarind	Rich in Ascorbic acid, tartaric acids and antioxidants	Dried pulp, Chutney and Sweeten pulp
Tendu	Rich in tannin content, carotenoids	Drinks, Jam, Jelly, RTS

Table 3. Different vegetables with their nutritional importance and value added products

Vegetables name	Nutritional importance	Processed and value added products
Amaranthus	Calcium, iron and fibre	<i>Parantha, Raita, Pudi, Pakora</i> and dried powder
Chenopodium	Vitamin A, folic acid, calcium and potassium	<i>Parantha, Raita, Pudi, Pakora</i> and dried powder,
Drumstick	Phosphorus, potassium, rhamnose and protein rich	Dried pods, seeds powder, capsule
Jack Bean	Carbohydrate, calcium, phosphorus	Seed used for flour preparation, dried seeds
Kachri	Vitamin A, ascorbic acid, phenols and minerals	Slices, Bhaji, Panchkuta, Pickles
Kakrol	Protein rich, carbohydrates, lutein	Dried flakes, powder
Kummat	Protein, fibre, folates	Dried seeds, Panchkutta
Kundru	Vitamin B and iron	Dried flakes, powder
Phoot	Vitamin B complex and folates	Dried slices, osmodried flakes
Water Spinach	Protein, riboflavin, vit. C and E	Veggie, Salad, Bhaaji

dried foods also prove their worth in changing the socioeconomic status of the people in rural areas.

Marketing strategies for ethnic foods

It is well known that there is no organized market is available for these foods. Only rural markets and *Hatts* bazaar are contributing a little in the marketing of these products. The major limitations are:

- Exploration limitations, lack of systematic knowledge among a large number of people.
- These products are confined to a limited area and marketing.
- Research and investigation are

limited.

- Lesser known of their nutritive value and medicinal importance
- Lack of marketing supply chain and linkage between producer and marketing.
- There is no branding pattern and quality pattern. Lack of commercial producers is also one of the important lacunas.

Moreover, these are locally sold by households and small scale processors. Now a day, products like papad, rabadi, dried fruits and vegetables can be seen on grocery soaps in sealed packets. Apart from, some companies are coming forward

to accept some market policies of these products. State government based NGO's, Self Help Groups and FPO's are coming forward. People linked with these organizations are getting trained and making them aware about value of these products. Some organized markets like Uphar Super Market, Pai group of marketing, Reliance Fresh, Mother Dairy, etc., purchasing these products especially dried products and sell to consumers in urban areas. Khadi Gramodyog, Kisan Mela's, Agricultural Universities, Krishi Vigyan Kendras need to be come in frontline mode and could play



Fig. 5. Underutilized fruits are rich basket of nutraceuticals

leading role in popularizing of these products. APEDA and NABARD can be provide some financial assistance to setup these food based agro industries at lower and home scale. This could really help to setup those industries and smooth running of local business. A supply chain system can be generated by private or public sector marketing agencies.

SUMMARY

Under Indian condition uses of these traditional foods could play crucial role in overcoming food and

nutritional security. Processing and marketing of ethnic foods have great scope and area under this changing scenario. As a result of some hazards outbreak, this system of food could be a milestone to poor families and tribal for their livelihood and surviving. Besides, high potential of therapeutic and medicinal uses can make more popular and awareness in urban areas. As people of western countries are again focusing on traditional food habits which are already well established in rural India, hence it also has export potential in

International market. This system of food production can generate employment opportunities and contribute a significant part in country's economy.

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