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## Encourage the potency of your Aahar with the power of Jowar (*Sorghum bicolor*)

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### Abstract

Millets, also referred to as "Sri Anna," which translates to "the best of all food grains," are attracting a lot of interest at present times. It has been estimated that we need to feed more than 2 billion people by 2050 to ensure global food security, and most of that output is anticipated to be from millet grains as these are climate resilient. *Jowar* is the fifth-most significant cereal crop in the world, after rice, wheat, corn, and barley and it is the primary cereal meal for more than 750 million people residing in semi-arid tropical parts of Africa, Asia, and Latin America. However, there haven't been any recent reviews on the significance of *Jowar* for nutrition and pharmacological purposes. Therefore, the goal of the present review is to provide a thorough description of the knowledge of its botanical distribution, agronomic, nutraceutical, pharmacological, and ayurvedic properties, as well as experimental and clinical studies. Furthermore, initiatives undertaken by the Indian government to promote millet are also discussed and highlighted.

**Keywords:** *Jowar*, millets, nutraceutical, pharmaceutical, Ayurveda

### 1. Introduction

According to Food and Agricultural Organization estimates, by 2050, more than 2 billion people would need to be fed for food security worldwide. Most of that production is expected to come from climate-resilient millet crops<sup>[1]</sup>. With 42% of the world's total millet production, India is the topmost millet producer<sup>[2]</sup>. In India, millets have been termed as Sri Anna (best among all food grains) and have witnessed a notable surge in popularity, particularly after the designation of 2018 as the National Year of Millets and 2023 as the International Year of Millets. Multiple stakeholder collaborations are being used effectively to incorporate these grains into the diets of common people as these have many benefits, including production ease (short duration, low water consumption, and climatic resilience), consumption (nutrition and health), and ecological (carbon neutrality)<sup>[3]</sup>. The cultural significance, nutritional superiority (rich in protein, dietary fiber, vitamins, and minerals), and environmental advantages (drought-resistant crops, short growing season), millets are a staple food for the tribal population of Indian states like Odisha, Uttarakhand, Madhya Pradesh, Rajasthan, etc.<sup>[4]</sup>

The various classes of millet include major, minor, and pseudo-millets. Major millets are Indian farmed finger millet, pearl millet, and sorghum (*Jowar*), minor millets include foxtail millet, tiny millet, kodo millet, proso millet, barnyard millet, and pseudo millets include amaranth, and buckwheat<sup>[5, 6, 7]</sup>.

*Jowar*, which finds its origin in Africa, and is scientifically known as *Sorghum bicolor* L., is a crop that belongs to the Gramineae family<sup>[8]</sup>. It was domesticated around 3,000–5,000 years ago and is currently ranked as the world's fifth-largest crop rich in carbohydrates, after wheat, maize, rice, and barley<sup>[8]</sup>. Nevertheless, *Jowar* is very vital in combatting hunger and food insecurity. It is essential to provide food security to a large section of the world's poor, who reside in fragile agro-ecological zones<sup>[9]</sup>. It is hence referred to as the "King of Millets" and is widely grown in Africa, China, the United States, Mexico, and India<sup>[9]</sup>. Specifically, it differs from other main cereal grains as several different bioactive compounds, such as anthocyanins, procyanidins, flavonoids, and phenolic acids are present in it<sup>[10, 11]</sup>. There are currently very few reviews describing the biological functions of *Jowar* grains, and there hasn't been any

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contemporary review on its nutraceutical and pharmaceutical significance. Consequently, the objective of the current review is to comprehensively describe the information on its botanical distribution, agronomic, nutraceutical, pharmacological, and ayurvedic features, as well as experimental and clinical research.

## 2. Methodology

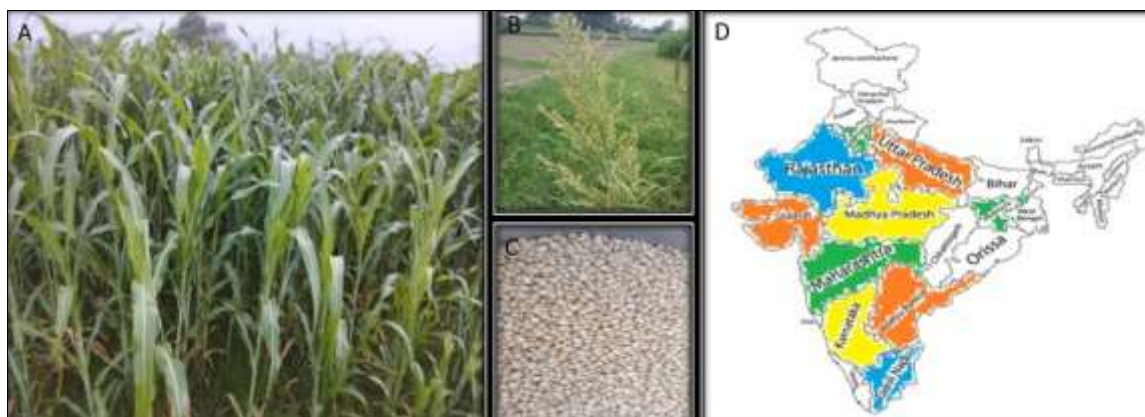
This study presents a thorough analysis of *jowar*, emphasizing its nutritional benefits, pharmacological values, market worth, and government initiatives. Information was gathered from several reliable sources, such as the Press Information Bureau (PIB), the annual report of the Indian Institute of Millets Research, reports from the Food and Agriculture Organization (FAO), and internet databases. PubMed, Google Scholar, pertinent scholarly publications, official government websites, and the Indian Food Composition Tables (IFCT-2017) were also consulted for information. Together, these resources helped to provide the thorough understanding presented in this article.

## 3. Jowar: Cultivation and vegetation

The two major concerns worldwide, for feeding the world's future population under climate change, are crop yield and food security [12, 13]. Extreme weather events and climatic variability are being recognized to have a significant impact on agricultural productivity [12, 13]. *Jowar* is one of the most effective in terms of converting solar energy and water consumption. Features like its high energy content and drought resistance, make it an ideal agricultural choice in the current scenario of climate change [14]. It also has high agronomic productivity i.e. the capacity to thrive in a range of

settings [15, 16]. *Jowar* is characterized to grow without any difficulty in conditions like infrequent water and high temperatures, high salinity, barren soils, high altitudes from the soil's surface etc. [15, 16]. This is explained by the highly developed root system of *Jowar*, which has a high root-to-leaf ratio, and by the leaves' wax coating, which causes them to roll in response to threats or other external stimuli [15, 16].

Due to its extraordinary resistance to low input levels, *Jowar* is a vital crop for regions with minimal rainfall [17, 18]. *Jowar* can thus play a critical role in feeding the most vulnerable people on the planet in the current scenario of increased demand for scarce freshwater supplies, growing use of marginal agriculture, and shifting climate trends [17, 18]. In conditions of abiotic stresses like water scarcity, excessive salt, low temperature, and ineffective nutrient ingestion, these would all result in better adaptation to climate fluctuation [17-19]. *Jowar* is a C4 plant that has a faster rate of photosynthesis and more potential for agricultural output as compared to C3 crops. It also exhibits a decreased rate of photorespiration and increased resistance against inhibition caused by oxygen [20]. Researchers have discovered that while preserving the cropped area and calorie output, expanding the area under coarse cereals (such as *Jowar*) enhances the nutritional supply (especially iron and protein), boosts climatic resilience, lowers greenhouse gas emissions, and requires less energy and water for irrigation [21]. Abiotic stress causes *Jowar* to undergo several physiological reactions that aid in the plant's adaptation and survival [22]. Most millet crops are pest-free. Thus, pesticides are not required. While some millet functions as an anti-pest agent to safeguard delicate pulses like green gram, most millet does not require fumigants, even when stored (Figure 1) [23].



**Fig 1:** *Jowar* A) and B) Natural habitat; C) Dried seed; D) Geographical distribution

## 4. Jowar: Ayurvedic aspect

*Jowar* has been mentioned by several authors of the classical Ayurvedic texts under various *Aahara* (Food) categories (Table 1) [24-29]. *Jowar* tends to be Madhura and Kashaya in *Rasa*, *Ruksha* (Dry), and easily digested (*Laghu*), according to

classical Ayurvedic texts. It has a cool potency (Sheeta Virya) and helps calm the Vata, Pitta, and Kapha Doshas. Additionally, it is supposed to help in the treatment of Rakta vikar (blood diseases). Ayurveda prescribes many *Jowar* cuisine dishes for a variety of diseases and nutritional needs.

**Table 1:** Categorisation of *Jowar* according to different Ayurvedic books

Ayurvedic text	Category
Madanpal Nighantu	Trun Dhanya
Dhanvantri Nighantu	Suvarnaadi varga
Charaka Samhita	Shuk Dhanya
Kayadeva Nighantu	Dhanya Varga
Bhavaprakasha	Dhanya varga
Raja Nighantu	Shalmalyadi varga

## 5. Jowar: Nutritional value

The abundance of nutrients and phytochemicals found in *Jowar* grains, including fiber, protein, fat, carbohydrate, vitamins, phenolics, and minerals, contributes to their high nutritional value [30]. In the sections that follow different nutrients that are present in *Jowar* are explained along with their importance to health (Table 2) [31].

### 5.1 Carbohydrates

The planet's most abundant storage polysaccharide, starch gives humans and other living things the most number of calories [32]. The main source of starch utilized in culinary and industrial uses is cereal grains [32]. The degree of starch digestibility in cereal grains is mostly determined by endosperm characteristics and processing techniques [32]. Because *Jowar* contains a higher proportion of slow digestible starch (SDS) and resistant starch (RS), it is widely believed to contain significant amounts of carbohydrates [32]. *Jowar's* main carbohydrate, starch, is mostly contained in the form of granules in the endosperm of the grain, while some are also present in the pericarp [33]. *Jowar* is an excellent source of consistent, continuous energy since these complex carbs degrade slowly [33].

The higher proportion of RS and SDS in *Jowar* can help consumers feel fuller for longer, which may lessen the need to snack and consume calories [34]. This results in a lower glycemic index and a decreased risk of developing chronic health conditions like type 2 diabetes and obesity [34]. *Jowar* contains a form of carbohydrate called arabinoxylans, or pentosans, which has been shown to alter the water balance, dough's structural properties, and starch's retrogradation [35]. These polysaccharides have branched arabinose residues and an Xylan backbone [36]. Researchers have examined the composition and level of carbohydrates in arabinoxylans obtained from *Jowar* that have good roti-making properties. [36]. Arabinoxylans are essential for enhancing the bread's quality [37].

### 5.2 Fiber

*Jowar* has a high fiber content. It is largely made up of soluble fibers (10%–25%) and insoluble fibers (75%–90%), which are present on the pericarp and endosperm cell walls and weigh around 6–15 g for every 100 g of grain [38]. The dietary fiber helps with digestion by giving meals more volume and

preventing constipation [39]. Its soluble fiber is beneficial for weight management since it helps control blood sugar, reduce cholesterol, and increase satiety [39].

### 5.3 Protein

*Jowar* proteins can be classified as either non-prolamin (globulins, glutelins, and albumins) or prolamin (kafirins, for example) [40]. Thirty percent of the protein stored in *Jowar* grains is made up of albumins, glutelins, and globulins, with kafirin making up the remaining seventy percent [40]. The four molecular-weight kafirins ( $\alpha$ -,  $\beta$ -,  $\gamma$ -, and  $\delta$ -kafirin) are hydrophobic proteins that are kept in tightly coiled protein bodies in the endosperm [40]. Like other cereal grains, *Jowar* grains are high in glutamic acid, proline, and leucine but may be low in lysine; however, *Jowar* breeding or food fortification may assist to address this issue [41].

### 5.4 Lipid

The lipids in *Jowar* grains, which are mostly found in the scutellum area of the grain, have a distinct fatty acid composition [42]. Its main components are stearic acid (18:0), linoleic acid (18:2), oleic acid (18:1), palmitic acid (16:0), and linolenic acid (18:3) [42]. High ratios of oleic and linoleic acid indicate their significance in the total fatty acid composition [42].

### 5.5 Vitamins and Minerals

*Jowar* grain is a good source of water-soluble vitamins like pyridoxine, riboflavin, and thiamin, as well as lipid-soluble vitamins like A, D, and K [38]. It also has a significant amount of  $\beta$ -carotene, the provitamin of vitamin A, and tocopherols [38]. Millets and *Jowar* don't contain vitamin A, however, some varieties with yellow endosperm do contain tiny amounts of 13-carotene, a precursor to vitamin A. Vitamin C is absent from uncooked millet grains. *Jowar* has a mineral concentration that is similar to millet, greater than maize but lower than wheat. It is mostly composed of potassium and sodium. *Jowar* diets are rich in iron and zinc, but they can also be low in bioavailability due to phytoconstituents like phytates. This issue affects all grains and plant foods in general, not only *Jowar*. However, as the phosphorus fertilizer amount is increased, the *Jowar's* mineral content does increase. The season, water, and plant population density all have distinct effects on grain composition [23, 43, 38].

Table 2: Nutritive value of *Jowar*

Macronutrients			Micronutrients		
S. No	Constituents	Range	S.no	Constituents	Range
1.	Energy	1398±13 KJ	8.	Thiamine (Vitamin B <sub>1</sub> )	0.35±0.039 mg
2.	Protein	9.97±0.43 g	9.	Riboflavin (Vitamin B <sub>2</sub> )	0.14± 0.014 mg
3.	Carbohydrates	67.68±1.03 g	10.	Niacin (Vitamin B <sub>3</sub> )	2.10±0.09 mg
4.	Total Fat	1.73±0.31 g	11.	Pantothenic acid (Vitamin B <sub>5</sub> )	0.27±0.02 mg
5.	Total Saturated fat	163±6.2 mg	12.	Pyridoxine (Vitamin B <sub>6</sub> )	0.28±0.023 mg
6.	Total Monounsaturated Fat	314±13.7 mg	13.	Biotin (Vitamin B <sub>7</sub> )	0.70±0.06 µg
7.	Total Polyunsaturated Fat	524±18.3 mg	14.	Folate (Vitamin B <sub>9</sub> )	39.42±3.13 µg
			15.	Ascorbic acid (Vitamin C)	-
			Fat Soluble Vitamins		
			16.	Tocopherol (Vitamin E)	0.06±0.01 mg
			17.	Phylloquinone (Vitamin K)	43.82±4.84 mg
Important Minerals and Trace Elements					
S. No	Constituents		Range		
18.	Calcium		27.60±3.71 mg		
19.	Copper		0.45±0.11 mg		
20.	Iron		3.95±0.94 mg		
21.	Magnesium		133±14.8 mg		



22.	Phosphorus	274±35.7 mg
23.	Potassium	328±25.1 mg
24.	Sodium	5.42±0.21 mg
25.	Zinc	1.96±0.31 mg

## 6. Jowar: Pharmaceutical value

Due to its phenolic compounds, which constitute one of the most significant classes of naturally occurring antioxidants and chemo-preventive agents, *Jowar* and its co-products have been regarded as a source of functional and nutraceutical benefits [44-46]. *Jowar* grain possesses strong anti-inflammatory, anti-cancer, and cholesterol-lowering qualities in addition to its high antioxidant activity [44-46]. Frequent intake of *Jowar* grain has been linked to a possible lower risk of type II diabetes, cardiovascular disease, and some cancers. [44-46].

Phytochemicals found in *Jowar* with antioxidant properties, such as phytic acid, polyphenols (phenolic acid, flavonoids, procyanidins), tannins, and sterols, have been shown to reduce the incidence of chronic illnesses and play a role beyond simple diet [10, 47]. Owing to their high antioxidant capabilities, polyphenols aid in lowering oxidative stress inside the body and may have anti-tumor activities [10, 47]. Furthermore, of all the cereal grains, *Jowar* contains the highest content of phenolic compounds and is the sole food source of 3-deoxyanthocyanidins (3-DXAs) [48]. The gut microbiota is also improved by bioactive compounds found in *Jowar* grains [49, 50]. The medicinal value of *Jowar* is discussed below (Figure 2).

### 6.1 Antioxidant Activity

Many chronic illnesses are mostly caused by oxidative stress, which arises from an imbalance between antioxidants and free radicals [51]. The antioxidant potential of phenolic chemicals connected to jowar seems to be very important for both disease prevention and health promotion [51]. Dissimilar to other major cereal crops, many strains of *Jowar* have large levels of grain polyphenols, 60 percent of which are bound and the remainder as free molecule [52]. 373 genetically varied *Jowar* strains from around the globe were studied, and the results showed that the total phenol content of the whole grain ranged from 0 to 37.46 mg gallic acid equivalents (GAE)/g. [53]. Furthermore, the concentration of condensed tannins, a significant polyphenolic component found in *Jowar* grains, varied from 0 to 78.51 mg catechin equivalents/g [53]. These levels are far greater than those seen in berries strong in polyphenols, such as blueberries, which have been extensively researched for possible health benefits [54, 55].

Another study claims that hydroxycinnamic acids, which are predominantly present in the insoluble-bound portions of phenolic acids, are the most prevalent phenolics in millets, including *Jowar* [52]. The most common form of hydroxycinnamic acid is ferulic acid, which is also a kind of antioxidant [56]. Ferulic acids do not need microbial activity during digestion to be released into the colon because of their strong antioxidant qualities when bonded [57].

### 6.2 Anti-inflammatory effect

Numerous chronic disorders can arise from inflammation caused by prolonged oxidative stress [58, 59]. Inflammation results in the production of inflammatory substances such as prostaglandin E2 (PG-E2), tumor necrosis factor (TNF), cyclooxygenase (COX)-2, and interleukin (IL) [58, 59]. Many phenolic chemicals found in *Jowar* grain have been shown in studies to be able to stop the creation of these pro-

inflammatory molecules [58, 59]. For instance, it has been demonstrated that the phenolic acids gallic acid and ferulic acid inhibit the COX-2 enzyme, while ferulic acid decreases the production of prostaglandin E2 (PG-E2) and (TNF)- $\alpha$ . [60]. Apigenin and luteolin are two flavonoids that decrease COX-2 and nuclear factor kappa B, a transcription factor that controls the synthesis of pro-inflammatory chemicals [60].

Studies also reported that the enzyme involved in chronic joint inflammation, hyaluronidase, was suppressed by phenolic extraction from *Jowar* bran [10]. Regardless of the pericarp colors and condensed tannin content, all *Jowar* genotypes exhibited a strong inhibition against hyaluronidase activity [10]. Triacylglycerols, carotenoids, tocopherols, and unsaturated fatty acids from *Jowar* have also shown that, in addition to phenols, lipopolysaccharides (LPS) can have inhibitory effects on the inflammatory response by reducing the expression of specific genes [10].

### 6.3 Anti-cancer effect

*Jowar* phenolic compounds may have anti-cancer qualities, and whole-grain *Jowar* diet may lessen the occurrence of various malignant diseases [61]. Cancer cells from the colon, esophagus, intestinal epithelium, breast, leukemia, and stomach can be resistant to the production of 3-deoxyanthocyanidin and extracts high in 3-deoxyanthocyanidin [62]. These compounds directly combat cancer by triggering cell death and inhibiting cancer cell multiplication [62]. Compared to anthocyanidin counterparts, 3-deoxyanthocyanidins exhibit a greater degree of this characteristic [63]. The anticancer impact of *Jowar* is assumed to be due to its high antioxidant activity and phase II enzyme activation of its phenolic components [64]. Previous research revealed that high-polyphenol *Jowar* modulates colitis, one of the leading causes of colon carcinogenesis [65, 66]. According to research, *Jowar*-derived tannins are more efficient than grape seed tannins in limiting the spread of colon cancer cells. [67].

Recent research shows that a new high-phenol *Jowar* (PI570481 accession) from Sudan has pro-apoptotic activity with elevated caspase-3 and PARP cleavage in human colorectal cancer cells (HCT15, SW480, HCT116, and HT-29) [68]. The activation of the DNA damage pathway and the production of ATF3, a proapoptotic protein, are both linked to an increase in apoptosis [68]. Conversely, the beneficial effects of the *Jowar* component can result from a p53-independent mechanism [68]. Furthermore, increased phenolic content compounds in *Jowar* (accession PI570481) reduced the spread of human colorectal cancer cells by delaying the S phase [68].

### 6.4 Anti-diabetes and obesity

A diet rich in whole grains, such as *Jowar*, will be beneficial for people with diabetes and obesity [69]. One grain that digests slowly is *Jowar* [69]. *Jowar* endosperm has a significant concentration of poorly digested and refractory starch [69]. *Jowar* extracts reduce triglyceride accumulation and serve an important function in pancreatic lipase enzyme lipid metabolism [70]. A *Jowar*-rich diet reduces lipid levels in rats, according to research [71].

Researchers discovered that healthy adults who ingested all-

grain *Jowar* biscuits had higher ratings of hunger and satiety than those who consumed wheat biscuits [72].

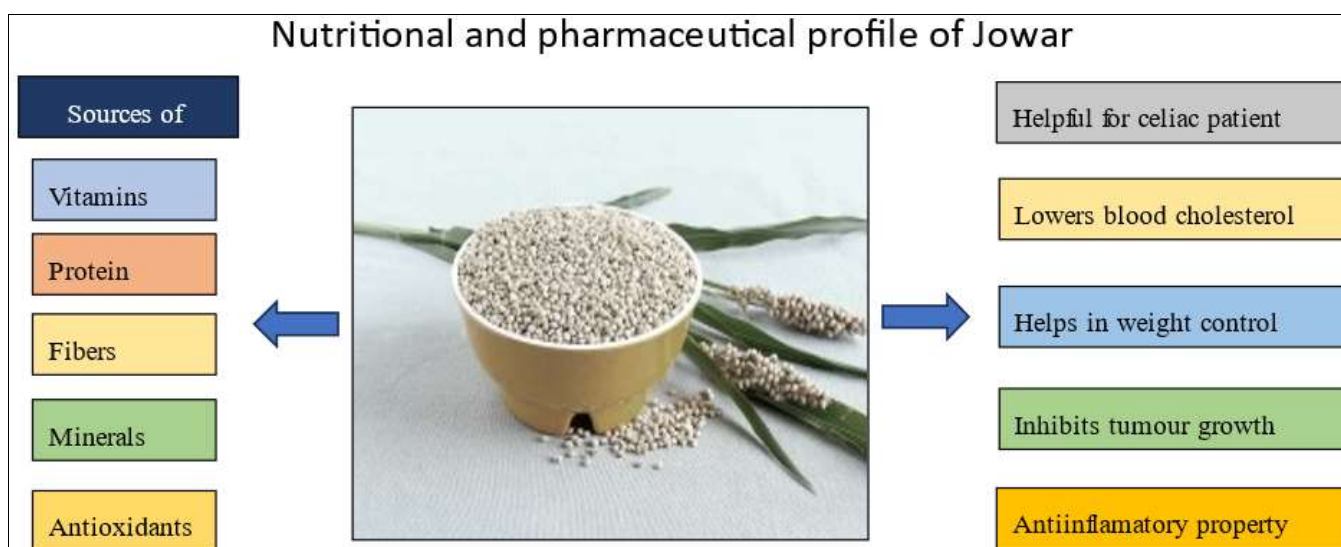
According to research, in streptozotocin-induced diabetic rats, phenolic extract considerably lowered plasma glucose levels and was found to be just as effective as the anti-diabetic medicine glibenclamide [73]. *Jowar* muffin studies have also been used to influence blood sugar and insulin levels, as well as to improve glycemic reactions in healthy people [32, 74].

### 6.5 Cardioprotective

*Jowar* grain has several bioactive phenolic chemicals that can help prevent dyslipidemia and cardiovascular disease. *Jowar* lipids, which contain phytosterols and polycosanols, have been proven to regulate cholesterol synthesis, release, and absorption, providing information about the cardiovascular system's health. *Jowar's* lipid component is linked to polycosanols and phytosterols. Polycosanols (33.4-44% of the total) are one of the most abundant components of the long-chained lipids extracted from *Jowar* grain kernels.

Polycosanols are a class of chemicals that have been shown to promote human health by lowering cholesterol levels and improving cardiovascular health. According to studies, unpolished *Jowar* grain has 74.5 mg/100 g of total polycosanols in the dry kernel, but refined grain contains just 9.8 mg/100 g. The difference in polycosanols content between polished and unpolished *Jowar* grain can be attributed to the removal of the outer layers during the polishing process [75].

Plant cell membranes require phytosterols, which are a kind of cholesterol [76]. The primary Phytosterols are found in cereal grain bran and can be isolated from bran's oil waxes. [76]. Because of their cholesterol-lowering properties, these chemicals promote cardiovascular health [76]. *Jowar* phytosterol concentration is affected by the cultivation technique [76]. Evidence suggests that feeding a guinea pig a diet high in low-tannin *Jowar* grains results in a considerable reduction in cholesterol when compared to diets high in wheat, rolled oats, or pearl millet [77].



**Fig 2:** Health benefits of *Jowar*

### 7. Jowar: Market value

India is the world's top producer as well as exporter of cereal goods. India is one of the top five millet exporters in the world [78]. Millet exports have risen from \$400 million in 2020 to \$470 million in 2021 (ITC trade map) [78]. In 2022-23, India exported millets worth \$75.46 million, up from \$62.95 million in 2021-22 [78]. The government has also begun developing a five-year strategic plan for the foster of millet and value-added millet products in the international market in association with the ICAR-Indian Institute of Millets Research (IIMR), Hyderabad, the ICMR-National Institute of Nutrition, Hyderabad, the CSIR-Central Food Technological Research Institute (CFTRI), Mysore, and Farmer Producer Organisations (FPOs) [79]. According to DGCIS data, India's millet exports climbed by 8.02% to 159,332.16 metric tonnes in fiscal year 2021-2022 from 147,501.08 metric tonnes the previous year [79]. Major international retail chains, including Walmart, Carrefour, Al Jazira, Al Maya, and Lulu Group, will be enlisted to create millet corners to brand and promote millets, as per the centre's millet promotion strategy [79]. MSP covers important millets such as *Jowar*, *Bajra*, and *Ragi*. The comparable MSPs for *Jowar* (hybrid), *Bajra*, and *Ragi* in 2021-2022 are 2738, 2250, and 2251, respectively [80].

"Millets have also been chosen in 19 districts across the

nation under the 'One District, One Product' scheme [81]. " Top FMCG brands such as Britannia, Nestle, HUL, and ITC have recently increased their millet-based offerings, as have companies such as Slurpp Farms and Tata Soulful, whose portfolio is focused on Nutri-cereals. Britannia, too, has included millets in its food line with its flagship brand Nutri-Choice. (82) "

### 8. Government initiatives

The Indian government has undertaken a variety of programs to promote millet including *Jowar*. States such as Odisha and Karnataka are developing their own millet promotion strategies and policies. The National Food Security Mission, (NFSM), which is part of the Ministry of Agriculture and Farmers Welfare, has a new policy to concentrate on millet production in the 12th five-year plan alongside wheat, rice, and pulses (NFSM, 2022). In 2018, India's Public Distribution System, one of the world's largest social safety nets that provides food to millions of food-insecure households, announced the addition of tiny millets. Millets are becoming more popular in India, appearing on premium restaurant menus, cooking shows, and in modern recipes (for example, Eat Right India - millet dish) [83-85].

The Ministry of Food Processing Industries (MoFPI) has also authorized the Production Linked Incentive Scheme for Food

Processing Industry for Millet-based Products (PLISMBP), which would be implemented from 2022-23 to 2026-27 with an investment of Rs. 800 crores. The government is sponsoring research and development at research institutions to promote millet. The ICAR-IIMR in Hyderabad is working on several NFSM-funded research projects involving food safety, database development, and shelf life. The CSIR-CFTRI is working on R&D projects to address value addition, millet processing, and product development constraints. A rise in the Minimum Support Prices (MSP) for Jowar, Bajra, and Ragi has been announced to encourage farmers to cultivate millet [86].

## 9. Results and Discussion

In this review paper where we have elected all the information about the Shree Anna and that too specifically about the *Jowar* and try to establish its importance, and significance in the day-to-day life of a common citizen across the globe. In this study, we have tried to reveal the power of *Jowar* in the maintenance of health in day-to-day life. Whatsoever the material available about the *Jowar* what we have searched out in all the literature available right from the literature of botany up to the literature available in the Ayurveda classic are very much encouraging and showing that *Jowar* has been indicated and counted as a very useful nutritional as well as medicinal vegetative. If we see the availability of *Jowar* it is already available all over the globe. In Ayurvedic text right from Charak Samhita to Nighantu, it is quoted and among this, the *Charak Samhita* has established firstly under the heading of *Shukdhanya* and then the *Madanpal Nighantus* and all the *Nighantus* has described as the *Jowar* and in the international year of millet, this *Jowar* is establishing its significance on all accounts of the health as it is included under major millets. We have recorded the outcomes of the research papers which are here showing the nutritional value of *Jowar*, how much energy it provides, and what the content is already quoted here, and based on all that we can conclude that it is a very good nutritional supplement and if a person using it in its daily routine of course with the some expect from the ayurvedic description also decided it is very important. The National Institute of Nutrition gives the whole information about the nutritional values here which are 25 in number, and all these are very important for the management of health everything related to its lipid, vitamins, and minerals profile is available here. In this writeup, we have also tried to cover the pharmacological values of the *Jowar*, and this is established through research papers related to its antioxidant properties, anti-inflammatory properties, anti-diabetic and obesity may be significantly controlled by the application of the *Jowar*, and of course some activities here as cardioprotective too. This year the international millet year was announced by the United Nations General Assembly after the recommendation and persuasions of the Government of India and here is a market value too. It will boost the economy of the country because India is one of the most important producers of millet. Indian Institute of Millet Research, Hyderabad, and the other ICAR units are contributing here something very significant which we have depicted in our writeup. The government has also made lots of awareness programs on every platform due to which the global population is aware of the importance of Shree Anna and specifically her we have noted down the applications of *Jowar* and finally we can say here that if the application of *Jowar* in the routine diet will be done then the human health will be promoted at large which is necessary for the development of the country.

## 10. Conclusions

Considering the facts quoted in the latest review paper our inference is *Jowar* is the most significant ingredient of the Shree Anna which can potentiate the routine diet of any citizen who needs eradication of a lot of elements and as well as for the promotion of his/her health. The word caution is here that the millets should not be used bluntly but before use of the millets, there is a need to consult with the Ayurvedic physician that which kind of millet how much, and when it should be used.

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