

Study of Nutritional And Health Benefits of Grapes In Indian Diet

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Abstract

In recent decades, seedless varieties of fruits are being preferred over seeded varieties. Ayurvedic texts have clearly mentioned that seedless varieties have less potency and ultimately lower health benefits, especially in the case of grapes. History of grapes highlights that seedless variety was an accidental event captured by the stakeholders and exacerbated over seeded variety for daily use. However, wine industry still prefers seeded variety and several reports claim that seeded varieties have higher phytochemical constituents than the seedless. Along with nutritional facts, Ayurveda has mentioned several health benefits of grapes. The phenomenon of seedlessness is being cherished over seeded in spite of the richness of the latter. Since, the agronomists and agriculturists, both are more interested in seedless variety 70% of the grape crop is seedless. Seeded variety, especially as black raisins, is being imported from countries like Afghanistan and Middle East countries. This survey was basically designed to know about the views on this seeded vs seedlessness debate. The results were quite expected that people are either unaware about this fact or are ignorant and consume whatever is available in market. This pilot study will definitely probe for further research in this field to unveil the exact phytochemical variations in both the traits and its direct implication on the magnitude of health benefit.

Keywords: *Fruits, Seeded, seedlessness, grapes, Ayurveda and health benefits, Indian diet*

I. Introduction

Fruits are one of the richest sources of nutrients, energy and health promoting components. They are considered as a complete food and even given the importance as only diet during fasting in Indian culture. Though Mango is considered as the king of fruits, several other fruits also inherit amazing health benefits along with being a dietary supplement. Grapes, Indian Gooseberry, pomegranate are few such fruits which are considered as “*Phalottam*” i.e., best fruits [1]. In this context, grapes are rich in nutrients like carbohydrates (sugars), dietary fibres, potassium, sodium, iron, calcium, magnesium and vitamins (C, B6). Precisely, 100 grams of grapes provide 70 calories while potassium and phosphorus fulfilling 4 and 3%, respectively, of the recommended daily value intake [2].

Nowadays, grapes’ seeds, seed oil, peel/ skin have also been studied for several health benefits including powerful anti-oxidation to anti-cancer activities [3]. Grapes berries are available as seeded or seedless, fresh (table) or dry (raisins) and white (green-yellow) or black. Along with being used as an important seasonal fruit or as a dry fruit, grapes have a huge market in beverage industry wherein tastiest wines are prepared out of grapes. In Indian market, however, mostly seedless variety is used as table grapes and seeded variety in wine industry [4].

Thompson seedless grapes formed by natural genetic mutation became one of the most famous varieties. It was accidentally found by Mr. Thompson who revived this seedless character and propagated from 1870 onwards [5]. However, *Bhavprakash Nighantu* (16 AD) has clearly mentioned about grape varieties that “*Abeeja*” i.e., those without seeds are less in efficacy as compared to those having proper seed (*Amradi Phal Varga* Chapter). He also mentioned of “*Parvataj*” i.e., those found in the hilly regions as a separate variety [1]. However, in *Charak Samhita* (200 BC) no such varieties are mentioned and only properties of Grapes (*Draksha*) are given [6]. *Draksha* also has a mention since Vedic literature and extensively mentioned in Ayurveda for 5000 years [7]. Grapes are bestowed as best nutritious fruit having wide range of activities in several diseases. It gives strength, is aphrodisiac, laxative, diuretic, anti-anemia, cardiac tonic, voice regulator and useful in tuberculosis, irritable bowel syndrome, burning sensation, debility, hemorrhagic disorders, jaundice, vomiting,

heart diseases, etc. It is being used in approximately 100 Ayurvedic formulations as one of the major ingredients[8].

In recent years, most of the grapes available in the market are seedless and people too prefer seedless grapes either due to easy availability or seeds feel uncomfortable while eating table grapes. In the dried varieties also, mostly brown/ yellow varieties are mostly used for several sweet cuisines which are again seedless. Hence, nowadays, seedless varieties are more in use and are not questioned about the comparative health benefits or the efficacy. Ayurvedic practitioners are aware of the fact that seeded variety is more useful than the seedless varieties. Recent researchers on seeded and seedless varieties have shown that seeded grapes possess more concentration of nutrients than the seedless one [9]. Grapes have shown cancer chemo-preventive potential and are also known to improve overall human health. Reports on recent advancements in cancer chemo-preventive and anticancer efficacy of grape seed extract and other grape-based products has shown that grape seed extract has anticancer effect in skin, colon, rectum, breast and others. They have proposed for extensive pharmacological studies required for human applications [10]. Thus, extensive clinical studies are needed to support the pre-clinical findings.

Interestingly, seeded variety is cropped less as table grapes and mostly for wine industry to impart tangy taste in the final product. Agricultural and Processed Food Products Export Development Authority (APEDA) states that Thompson Seedless and Sharad Seedless accounts 70% while Bangalore Blue Seeded, Anab-e-Shahi and Dilkhush (all seeded varieties) are grown only 30%. Major grape-growing state is Maharashtra (81.22 %) followed by Karnataka, Telangana, Andhra Pradesh, etc. India is the major exporter of grapes to the world (2,46,107.38 MT, worth of Rs.2,298.47 crores/ 313.57 USD Millions in 2020-21) [11]. These facts are less known by common people, cultivars, traders, food industry and are ignored due to lack of sufficient knowledge. Moreover, such seeded varieties of grapes, mostly black raisins, are imported from Afghanistan and other middle-eastern countries. These imported fruits bear a very prominent seed and highly preferable by Ayurvedic physicians to get Ayurvedic health benefits like laxative, strengthening and aphrodisiac properties [personal communication with a senior Ayurvedic Physician; Dr Sujata Bauskar (MD Ayurveda), Pimpri, Pune].

Thus, the present survey study was conducted to reveal awareness among common people. The main concept was to understand whether people realise that seedless varieties should not be demanded and seeded varieties are more useful in both table grapes as well as dry fruits. The questionnaire also aimed at whether people are concerned while buying grapes. The questionnaire will probe for further scope of research in evaluating the difference between seeded and seedless or it is only a like/ dislike factor.

II. Materials And Methods

The questionnaire (English version) was designed on Google Forms software focussing the fruit "grapes". The respondents those consuming grapes will answer the questions. A short title and introduction were given to the respondents to understand the subject. All the questions were compulsory and three options were given for each question. The questions were framed such that the respondents could arrive at a final answer. Each question indicates one specific subject of interest and relevant to the central theme of the questionnaire (A to J).

The first subject domain was grapes and respondents were asked whether they eat grapes regularly, in any form like fresh, dried, sweets, etc. (A) and more specifically in which form they consume grapes i.e., fresh, dried or both (B). The next domain was about their preference of seeded and seedless variety (C) and why do they prefer that variety (D) based on responses as "Seedless are tastier and seeds don't come under teeth while eating", "Seeded are tastier than seedless and the seeds feel crunchy while eating" and "Seedless are readily available and seeded are not". Further, they were asked about their general knowledge about Ayurveda, mentioning grapes as "*Phalottam*", i.e., fruit having best nutrition and health benefits (E). More elaborately, they were asked for Ayurvedic health benefits of grapes i.e., aphrodisiac, voice regulator, eye tonic, laxative, diuretic, bleeding disorders,

anaemia, weight loss, fever, burning sensation, jaundice, gout, urinary infections, fatigue, vomiting, fainting, diabetes and heart diseases, etc. (F). Another domain explored was about these properties or health benefits carried by traditional variety bearing seeds or hybrid seedless varieties (G). Furthermore, their knowledge of seeds having blood thinning, anticancer, antioxidant, etc., was assessed (H). Finally, they were questioned about their opinion about consuming traditional seeded grapes variety instead of hybrid seedless grapes (I) and their final decision about choosing seeded versus seedless variety (J).

The forms were distributed through electronic media. Data was retrieved in Microsoft Excel 2010 for data processing and plotting pie charts. Overall analysis was performed while age-wise analysis as youngsters (18-39 years) and elders (40 years and above) was also carried out especially, to understand the difference in mindset of seeded vs seedless.

III. Results

Total 52 responses were received with all the questions answered and all the demographic data filled properly. Overall analysis of these responses obtained is given in **Table 1** and the percentages obtained for each response is displayed in **Figure 1**.

Table 1. Number of respondents for each response per question and respective percentages

Subject	R1	%	R2	%	R3	%
A	13	25.0	35	67.3	4	7.7
B	10	19.2	7	13.5	35	67.3
C	17	32.7	9	17.3	26	50.0
D	13	25.0	24	46.2	15	28.8
E	37	71.2	13	25.0	2	3.8
F	20	38.5	10	19.2	22	42.3
G	27	51.9	6	11.5	19	36.5
H	27	51.9	14	26.9	11	21.2
I	38	73.1	6	11.5	8	15.4
J	7	13.5	26	50.0	19	36.5

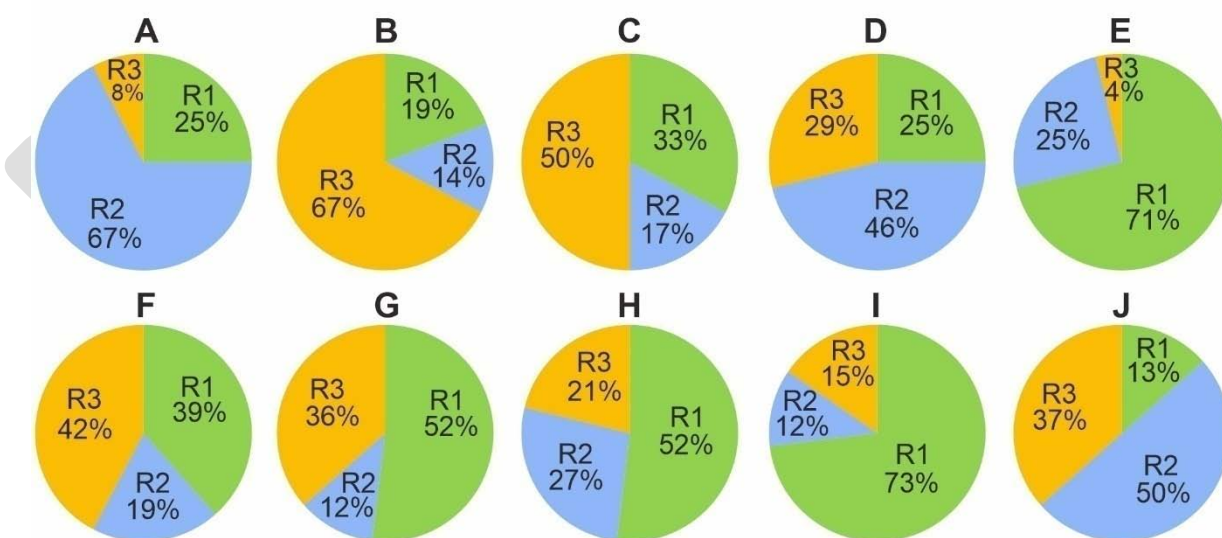


Figure 1. Overall percentage of respondents for each question asked in the survey

All respondents were adults, between ages 22 and 66 years wherein 30 were below 40 and 22 were 40+ years of age. Equal male and female respondents were included in the survey. Though grapes being a tasty fruit, is consumed regularly by only 25% people while more than 65% eat grapes only seasonally, irrespective of the grape form. A few people (<10%) do not eat grapes regularly. Majority of people (>65%) eat only fresh or raisin form of grapes while approximately 16.5% eat either of the forms. Half of the people do not bother whether the grapes have seeds or not while up to 30 and 10% people prefer seeded and seedless grapes, respectively. However, only 25% people like seedless variety since they find them tasty as compared to seeded (45%) which they feel are tastier, in spite of the crunchy seeds. Further, up to 30% people have no choice in selecting the seeded variety because seedless are available more easily.

More than 70% of people have the knowledge that Ayurveda has mentioned grapes as best fruit while 25% people are unaware of this information. A mere 4% do not bother about this aspect. In depth, nearly 80% people know about all or some of the health benefits of grapes mentioned in Ayurveda while 1/5th of the respondents was completely unaware of this information. Furthermore, when asked whether they know that the traditional benefits of grapes mentioned in Ayurveda are of seeded variety and not seedless; half of them agreed while 35% were not sure. Hardly, 10% firmly denied this statement. Interestingly, half of the people are aware of the health benefits of grape seeds while 25% are unaware and 20% are not sure about this information. Finally, more than 70% people feel that traditional seeded variety should be consumed whereas only 10% did not go with this opinion. Nearly, 15% people are not sure about using the seeded varieties. It should be noted that only 10% people firmly believe that seedless are more useful for no specific reason while half of the people believe that seeded are more useful. However, a considerable of 35% people are still unsure about the comparative goodness of seeded or seedless varieties.

Respondent age group-wise analysis of responses on seeded vs seedless varieties

Questions 3, 7 and 10 were analysed by dividing the study population in two groups as given in **Table 2**.

Table 2. Age-wise analysis of responses specific to seeded vs. seedless grape varieties

Subject	Response No.	No. of Respondents from Youngsters population (>40) (n=30)	No. of Respondents from Elderly population (≤40) (n=22)
C	R1	9	8
	R2	7	2
	R3	14	12
G	R1	15	12
	R2	3	3
	R3	12	7
J	R1	5	2
	R2	13	13
	R3	12	7

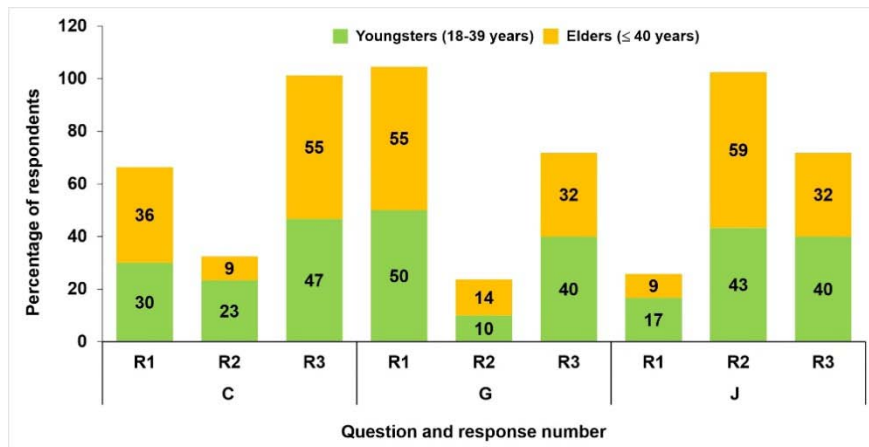


Figure 2. Comparative percentages of respondents from Youngsters and Elderly populations for seeded vs. seedless specific questions

Preferability of seeded or seedless grapes: Higher number of youngsters (23%) prefer seedless variety as compared to the elders (9%). However, 5-10% difference in preferability over seeded or whichever is available is seen when both the groups were compared.

Traditional health benefits of seeded or seedless grapes: A very less difference (4%) in opinion was found between youngsters and elders since both (half in each group) accepted that traditional health benefits seem to be given for the seeded variety. However, approximately 10% of respondents in both the groups did not agree. Nearly, 10% more youngsters are not sure about this factor as compared to the elders.

Usefulness of seeded vs. seedless grapes: Almost double number of youngsters as compared to the elders believe that seedless variety is more useful than the seeded variety. Almost 25% more elders as compared to youngsters believe that seeded grapes are more useful. Interestingly, 8% more youngsters as compared to elders are not sure about this factor.

IV. Discussion

Most of the varieties of grapes cropped in India are seedless. National Research Centre for Grapes, Pune, India has enlisted them in “Good Agricultural Practices for Production of Quality Table Grapes” (Thompson seedless, Manjri Naveen, Fantasy seedless, Flame seedless, etc.) and “Manual of Good Agricultural Practices for Quality Wine Production” (Cabernet Sauvignon, Merlot, Shiraz, Zinfandel, etc.) [4]. Though there are reports suggesting that both seedless and seeded varieties have similar pharmacological activities [12], on the other hand, some also report significant difference in the phytochemical constituents between both the traits [9]. However, most of the table grapes are seedless and routinely consumed by the population.

In the present survey, most of the respondents consume grapes seasonally (A) which is quite commonly practised in India and also advocated by Ayurvedic physicians to adjust with the environmental changes on human body due to that particular season [6]. Seasonal consumption enables the consumer to get all the desired health benefits as per the metabolic condition. Grapes are either consumed fresh and/ or in raisin form (B) during spring (*Vasant*) and summer (*Grishma*) seasons to pacify the increased heat and provide nutrition [1,6]. However, most of the table grapes available currently in the Indian market are seedless which are considered of less potency according to Ayurveda. Several traits of seedless grapes have been developed and are being developed by the national authorities in last 30 years [13]. Our survey clearly indicates that elders still prefer seeded variety while youngsters prefer seedless (C). This probably is since seeded varieties were highly sold in the market 30 years back and seedless were less since the export of seeded variety was less [14]. On the contrary, nowadays, seedless are mostly available and seeded are hardly found in table grapes

market. Moreover, the younger generation feel seedless variety more comfortable while elders are habitual to seeded varieties too (D).

Another aspect covered in this survey was about the awareness about the Ayurvedic aspect of usefulness of grapes as the best fruit (E, F). In addition, the survey further probed about these Ayurvedic health attributes of grapes linked only with seeded variety (G). Interestingly, people are aware that most of the benefits of grapes are mentioned in Indian Traditional System of Medicine i.e., Ayurveda, but many are not sure whether these benefits are more in seeded variety as compared to seedless. This highlights the necessity of further research to be conducted to prove this factor. It was also noted that people are not aware of the health benefits of seeds in grapes (H). However, majority of respondents either believe that seeded variety should be consumed or need supporting data to accept seeded variety as the best trait (I, J).

In further analysis based of age difference between the respondent, expected responses were noted (C, G and J). Younger generation are passive in accepting the seeded variety and need proof for the same while elder generation who have consumed seeded variety in their lifetime are more inclined towards consuming seeded variety. However, though the questionnaire emphasized on seeded vs. seedless variety of grapes, the responses received suggest a need to generate specific scientific data. Recent researches are focussing on developing seedless varieties of other fruits also like Papaya, custard apple, sapota, etc. [15]. The interference in the genes while natural selection or by crafting the genes to under-develop or remove seeds from the fruits [16] is probably not justifiable as per Ayurveda. Ayurveda postulates the theory of “*Loka Purusha Samya Siddhant*” i.e., Cosmos-Human Relationship Theory [6]. Consuming seeded variety might be a bodily need that needs to be investigated.

Seed lessness is a genetic defect occurring during the developmental stage that affects the overall development of the fruit. This causes changes in metabolic pathways of the fruit till maturation which might be responsible for overall metabolic and nutritional variation [17]. The repercussions caused due to the abortion of seed in seedless grapes [18] needs to be correlated with the overall impact on health benefits attributed to grapes according to Ayurveda.

Conclusion

Fruits are an integral part of Indian diet. However, seedless varieties of fruits are gaining control over the Indian market. Most of the people are not aware or are ignorant about the superiority of seeded grapes and rather consume seedless grapes since the latter are mostly available in the market. Thorough research needs to be conducted on the nutritional value as well as health effects of seeded vs. seedless varieties.

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