



SAMSARJANA KRAMA– A GRADUATED AYURVEDIC DIETPATTERN

KADAMBARI P B¹, DR. PRATHIBHA C K²,
DR. PARAMESWARAN NAMBOOTHIRI K³, DR. ANANDARAMAN P V⁴

1. KADAMBARI P B

MD (AY), ASSISTANT PROFESSOR, DEPARTMENT OF PANCHAKARMA, AMRITA
SCHOOL OF AYURVEDA, AMRITAPURI, AMRITA VISHWA VIDYAPEETHAM,
KOLLAM, KERALA, INDIA kadambaripb@gmail.com

2. DR. PRATHIBHA C K

M.D (AY) Ph. D, PROFESSOR, DEPARTMENT OF PANCHAKARMA, GS AYURVEDA
MEDICAL COLLEGE, PHILKHUWA, UTTAR PRADESH, INDIA
drprathibhack@gmail.com

3. DR. PARAMESWARAN NAMBOOTHIRI K

MD (AY), (Ph. D) PROFESSOR, DEPARTMENT OF PANCHAKARMA, AMRITA
SCHOOL OF AYURVEDA, AMRITAPURI, AMRITA VISHWA VIDYAPEETHAM,
KOLLAM, KERALA, INDIA anambu24@gmail.com

4. DR. ANANDARAMAN P V

M.D (AY) Ph.D, PROFESSOR & HEAD, DEPARTMENT OF PANCHAKARMA, ALL
INDIA INSTITUTE OF AYURVEDA (A.I.I.A), GAUTAMPURI, SARITA VIHAR, NEW
DELHI, INDIA dr.ananthramsharma@gmail.com

ABSTRACT

Agni (Digestive fire) is indispensable for the wellness and illness in humans. There are various factors which hampers the normalcy of *Agni* in the body and *Samsarjana krama* (Graduated diet pattern) plays a key role in correcting the *Agni*. Through this article we intend to have a detailed thorough literature search on *Samsarjana Krama* and to explore its utility. Thus, *Samsarjana Krama* can be widely practiced in the treatment protocols. *Samsarjana krama* is a series of diet for upgrading or an order of diet for increasing *Agni*. There are various methods of *Samsarjana krama* explained in Ayurveda texts and they are practiced in different clinical conditions. The word *samsarjana krama* implies the meaning “proper way to upgrade” *Agni* which was disturbed or diminished due to various reasons. There are various methods of *Samsarjana krama* explained in *Ayurveda* texts and they are *Peyadi samsarjana krama*, *Tarpanadi samsarjana krama*, and *Rasa samsarjana krama*. They are practiced in different clinical conditions.

Modifications are necessary in certain conditions like when the patient is vegetarian, non-availability, and aversion. Rather than including *samsarjana karma* under *paschat karma*, it can be included as *Ayurvedic* diet for corrections of *Agni* whenever there is a depletion. Through a thorough literature review we could understand that relevance of *samsarjana* but due to practical difficulties, strictly following the classical diets may not be possible. Thus, certain

modifications can be applied without altering the classical authentic principals of *samsarjana krama*

KEYWORDS

Ayurvedic Diet, Peyadi Krama, Paschat Karma, Ayurvedic food

MANUSCRIPT

1. Introduction

Agni (the element of fire) has an integral role in every science. Even today *Agni* is regarded as the Hindu deity. *Agni*, being one among the *Pancha Mahabhoota* (five gross elements) is instant in every living body in cosmos. *Agni* is indispensable for the birth and survival for all creatures. Hence, we can say that *Agni* is the reason for the wellness and illness in humans. Thus, the importance of *Agni* can be clearly cogitable. According to *Ayurveda*, the theory of *Agni* has a prime importance as all the diseases are originated due to the hindrance of *Agni* associated with many other factors. Balanced *Agni* is a major element to maintain a healthy life [1]. There are various factors which hamper the normalcy of *Agni* in the body and *Samsarjana krama* (graduated diet pattern) plays a key role in correcting the *Agni*. A health of the individual is when the *Dosha* (humors of the body), *Agni*, *Dhatu* (tissues of the body) is in the state of equilibrium [2]. Any alterations in the state of these factors result in the diseased conditions or unhealthiness.

We are what we eat. It is important to eat regularly to gain energy for the daily requirements. Meanwhile it is necessary to eat healthy foods to have a healthy body and mind. In the present scenario, people are more concern about the health and looking forward for a well- balanced diet chart. A balanced diet plays a key role in every medical science. A balanced diet is usually advised by a Physician for a healthier lifestyle. *Samsarjana Krama* is such a balanced diet charted by *Ayurveda Acharya* ages ago depending upon the level of *Agni* of an individual. Through this article we intend to have a detailed thorough literature search on *Samsarjana Krama* and to explore its utility. Thus, *Samsarjana Krama* can be widely practiced in the treatment protocols.

Derivation and definition of the word

The word *Samsarjana Krama* is coined by three separate words. *Sam* is an *upasarga* which means *Samyak* (best) and *Sarjana* means upgrading, giving, or increasing. *Krama* means series, order, course, proceeding, or step. According to M. Monier Willums dictionary, *Samyak* is proper, or in a good way. *Krama* is order. Thus, we can say that *Samsarjana krama* is a series of diet for upgrading or an order of diet for increasing. As such we do not find a word called *Samsarjana* in any verses of classical *Ayurveda* texts. The term *samsarjana* is introduced by *Chakrapani* (a commentator) in His commentary on *Charaka Samhita* [3].

As *Acharya* has not given a definition on *Samsarjana krama*, we can briefly mention it as the strict and streamlined dietary regimens to be followed by an individual to bring back the disturbed *Agni* into normalcy after *sodhana* (detoxification therapies), *snehapana* (oral intake of ghee), and *langhana* (emaciating therapies) [4]. There are various methods of *Samsarjana krama* explained in *Ayurveda* texts and they are *Peyadi samsarjana krama* [5], *Tarpanadi samsarjana krama* [6], and *Rasa samsarjana krama* [7]

1.2 Indications of *Samsarjana krama*

Table 1: Indications of *Samsarjana krama*

Texts	Indications
<i>Charaka Samhita</i>	After <i>Vamana</i> (emesis), <i>Virechana</i> (purgation), in <i>Mandagni</i> , and <i>Langhana</i>
<i>Susruta Samhita</i>	After <i>Snehapana</i> , <i>Vamana</i> , <i>Virechana</i> , <i>Raktamokshana</i> (blood-letting), <i>Niruha basti</i> (decoction enema), and in <i>agnimandatha</i> .
<i>Ashtangahridayam</i>	After <i>Shodhana</i> , <i>Raktamokshana</i> , <i>Snehana</i> , and in <i>Langhana</i>

After *Sodhana* and elimination of the *dosha*, the *Agni* of the person gets subdued. For such a person, *Peyadi Samsarjana krama* must be advised. Here, *Vamana* (emesis) and *virechana* (purgation) are considered as the foremost *sodhana* procedures. Even though elimination of *dosha* (3 humors- *vata*, *pitta*, and *kapha*) takes place in *Niruha Basti* (decoction enema), it is not mandatory to administer *Samsarjana krama* in *basti* (enema) as the *agnimandya* is not predominant in *basti* procedure.

The benefit of *Peyadi* is explained with a beautiful smiley. As a small spark of fire get kindled into a strong and stable flame when it is gradually fed with igniting substances like dry grass, and cow dung cake. Similarly, the *Agni* of the individual becomes capable for digesting all types of food materials with the administration of *Peyadi Samsarjana Krama*. There is a chance of *vata prakopa* (aggravation of *vata*) soon after the *samsarjana krama*. In those conditions, the normal diets administered can be in the following pattern of tastes

Sweet, bitter	- <i>vata pitta</i> alleviation, normalize digestive fire
Sour, salt, katu	- <i>vata kapha</i> alleviation
Sweet, bitter	- <i>pitta vata</i> alleviation
Astringent, katu	- <i>kapha</i> alleviation

There are six varieties of diet in *Peyadi krama*. They are as follow

1. *Peya*
2. *Vilepi*
3. *Akruta yusha*
4. *Kurta yusha*
5. *Akruta mamsa rasa*
6. *Kurta mamsa rasa*

Pravara[8] (maximum), *Madhyama* (moderate), and *Avara* (minimum) are three types of *shuddhi* (measure of *dosha* elimination). The diets are administered depending upon the *shuddhi* obtained after the *shodhana* procedure. In *Pravara*, *Madhyama*, and *Avara shuddhi* all these six diets are administered consecutively for three, two and one *Annakala* (meals time) respectively.

Table 2: *pravara suddhi*[9]

<i>Pravara suddhi</i>		
Day	st 1 <i>annakala</i>	nd 2 <i>annakala</i>

1	-	<i>Peya</i>
2	<i>Peya</i>	<i>Peya</i>
3	<i>Vilepi</i>	<i>Vilepi</i>
4	<i>Vilepi</i>	<i>Akruta yusha</i>
5	<i>Kruta yusha</i>	<i>Kruta yusha</i>
6	<i>Akruta rasa</i>	<i>Kruta rasa</i>
7	<i>Kruta rasa</i>	Normal diet

Table 3: madhyama suddhi[10]

<i>Madhyama suddhi</i>		
DAY	st 1 <i>annakala</i>	nd 2 <i>annakala</i>
1	-	<i>Peya</i>
2	<i>Peya</i>	<i>Vilepi</i>
3	<i>Vilepi</i>	<i>Akruta yusha</i>
4	<i>Kruta yusha</i>	<i>Akruta rasa</i>
5	<i>Kruta rasa</i>	Normal diet

Table 4: avara suddhi[11]

<i>Avara suddhi</i>		
DAY	st 1 <i>annakala</i>	nd 2 <i>annakala</i>
1	-	<i>Peya</i>
2	<i>Vilepi</i>	<i>Kruta yusha</i>
3	<i>Kruta rasa</i>	Normal diet

***Peya*(thin gruel of rice)**

Peya is *Manda Pradhana Yavagu* which means it is dominant of liquid portion. *Peya* is prepared with 1 part of *Purana Lohita Shali* (old and red variety rice) and 14 parts of water, cooked well. *Peya sikta samanvitha* which means along with the rice

It alleviates hunger, thirst, fatigue, weakness, and abdominal discomfort; it is anti-pyretic, initiates sweating and acts as appetizer, expulses flatus and feces [12]. *Peya* is administered as warm without adding salt.

***Vilepi* (thick gruel of rice)**

Vilepi is *Virala Drava* which means it contains less amount of liquid content. It is *Bahusiktha* (more solid portion). It is nourishing [13], light. It is administered in warm condition without

adding salt or less amount of salt. Preparation of *vilepi* is with 1 part of rice added to 4 part of water to get a semi solid gruel.

There are few practical problems regarding the preparations of *vilepi*. The ratio mentioned in the classical texts might produce burnt rice due to less amount of water. This can be modified by adding twice amount of water mentioned.

Yusha (soup)

Yusha is prepared with pulses usually *Mudga* (green gram) is preferred because *Mudga* is *laghu* [14] (easy to digest). *Yusha* is prepared by adding 1 part of *mudga* and 14 parts of water. Properties of *mudga yusha* are *kaphahara*, *deepana*, and *hrudya*.

According to *Sarangadhara*, preparation of *Mudga yusha* is

<i>Mudga</i>	- 1 <i>pala</i>
<i>Pippali & sunti</i>	- ½ <i>karsha</i> each
Water	- 1 <i>prastha</i>

While preparing the *yusha*, instead of water other liquids like any required *kashaya* (decoction), *swarasa* (extract/ vegetable juice), *takra* (buttermilk) can be added. Mainly there are 2 types of *Yusha* and they are *Akruta* and *Kruta*. *Akruta yusha* is prepared without adding both *Sneha* and *lavana* whereas *kruta yusha* is prepared by adding *sneha* and *lavana*

Mamsa rasa

Like *yusha*, the preparation of *mamsa rasa* is by adding 1 part of *mamsa* and 14 parts of water. The meat of the animals like *lava*, *kapinjala*, *aja* (goat), and *tittira* can be used. The properties of the *mamsa rasa* are *preenana*, *pranajanana*, *swasahara*, *kasahara*, *vata pitta* humor alleviating), *hrudya*, *swarakara*, *jwarahara* (anti-pyretic), *sukravardhana*, and *balavardhana* (nourishing).

All these preparations are very scientifically charted according to the gradual increase of the *agni*.

Tarpanadi karma

Another type of *samsarjana karma* which is indicated in:

1. *Kapha* and *pitta* dominant diseases [15]
2. Alcoholic
3. Improper cleansing therapies

Tarpanadi karma is slightly different from *peyadhi samsarjana karma*.

Peya is substituted with *swaccha tarpana* [16] and *vilepi* with *Ghana tarpana*.

Preparations:

Swaccha tarpana - 1 part of *lajja* + 14 parts of water

Ghana tarpana - 1 part of *lajja* + 4 parts of water

Rasa samsarjana karma

Rasa samsarjana is a special type of *samsarjana karma* which is mainly done with the *rasa* (tastes). After *sodhana*, physician handling with the post therapeutic measures should give the patient the diet beginning with *peya* and ending with *rasa* for proper stimulation of *Agni*.

Indications:

1. After *peyadi karma* [17]
2. After *niruha basti* [18]

After the end of *peyadi samsarjana karma* when a patient begins normal diet intake there is a chance of *doshakopa* hence *rasa samsarjana* is advised in such complications.

Table 5: rasa pradhanya samsarjana krama

CHARAKA SAMHITA [19]		SUSRUTA SAMHITA [20]	
Rasa	Indications	Rasa	Indications
Amla, madhura	Vata samsamana	Madhura, tikta	Vatapittasamana, agnivardhana
Amla, lavana	agnivivardhana	Amla, lavana, katu	Vatakapha samana
Tikta, madhura	Pitta samana	Madhura, tikta	Pittavata samana
Kashaya, katu	Kapha samana	Kashaya, katu	Kapha samana

Commentators opine that the *rasasamsarjana* can be advised to the patients after *niruha basti* where the disturbance of *Agni* is very minimal comparing to *shodhana* (*vamana* and *virechana*) because the *basti* has no big role in the *agnisthana*.

The answer to the question, when to begin *samsarjana karma* is explained in detailed in the classics.

1. On evening (on the day of procedure)
2. Or next day morning
3. When patient feels hunger
4. After taking bath in warm water

We can stop the *samsarjana karma* and advise the patient to shift to normal diet only after the appearance of these symptoms:

1. Can digest all types of food items
2. Non obstruction of *vegas*
3. Restoration of enthusiasm
4. Proper functioning of sense organs
5. Regain strength.
6. Improve mental power

1.3DISCUSSION

The word *samsarjana krama* implies the meaning “proper way to upgrade” *Agni* which was disturbed or diminished due to various reasons. There is a set of diets mentioned in the Classical *Ayurvedic* texts to correct to *Agni*. *Peaya* is widely explained in the context in the *jwara* (fever) where the diminution of *agni* is very extensively seen. The drugs which have the anti-pyretic properties are used in the preparation of the *peaya*. The *peaya* is processed with the dry ginger, coriander, and Indian long piper to improve the digestion, appetite, and acts as anti-pyretic.

According to the therapeutic diet manual, clear liquid diet has the same principle of *peaya*. Clear liquid diet is used in the acute stage of many diseases, especially those with elevated temperature. Even though there are different types of *samsarjana karma* few other diets are also explained, may be like an alternative method or as a substitute. In *mamsa rasa* preparations, the *mamsa* of *harina, ena, mayura, tittira*, and *shasha* can also be used and in *yusha* preparation, *shastika shali, aadaki*, and *kulatha* can be used.

Table 6: diet pattern with their composition

PEYA	Liquid in large quantity + rice (solid) in small quantity	Less carbohydrate, easy absorbable
VILEPI	More rice (solid) + less liquid	carbohydrate
AKRUTA YUSHA	Pulse without salt and fat	Plant Protein

<i>KRUTA YUSHA</i>	Pulse with salt and fat	Plant Protein + added fat
<i>AKRUTA MAMSA RASA</i>	Fat without salt and fat	Animal protein & fat
<i>KRUTA MAMSARASA</i>	Fat with salt and fat	Animal protein & fat + added fat

This shows the scientific method of adopting a diet chart for the correction of digestion after a diseased state or a procedure or fasting.

Pulses and whole grains are considered staple foods that provide a significant amount of calories, fibre and protein, making them key food sources in a nutritionally balanced diet [21]. Some examples for cereals are rice, barley, wheat, maize, corn, millet, sorghum, millet, oats, triticale, rye and buckwheat. Some examples for pulses include beans, peas, cowpea, dry beans like pinto beans, kidney beans, navy beans, dry peas, lentils, peanuts, Mung bean, golden gram, green gram.

Cereals act as the largest energy provider than pulses. On average, Cereals are composed of ~ 75% carbohydrates (mainly starch), 6-15% proteins in full grains, which may vary from species to species and contribute ~ 50% of the global energy terms [22]. The digestibility of starches in cereals, both in terms of absolute amount digested and the rate, at which it is hydrolyzed, is higher than that of pulse starches. The amylose content of cereal starches is 20-25%, which is lower than pulses. Amylose is a tightly packed structure and is more resistant to digestion than other starch molecules and is therefore an important form of resistant starch, which has been found to be an effective prebiotic. Cereals contain less protein content (5-15%) compared to pulses. Cereals are rich in amino acid methionine compared to pulses. A large proportion of our cells, muscles and tissue are made up of amino acids, meaning they carry out many important bodily functions, such as giving cells their structure. Methionine is one of the essential amino acid which assists with metabolic function.

Pulses contain 55-65% carbohydrate and contain approximately 21–25% protein [23], and energy compared to cereals. Pulses are rich in proteins, whereas cereals are rich in carbohydrates. Protein is essential to the structure of red blood cells, for the proper functioning of antibodies resisting infection, for the regulation of enzymes and hormones, for growth, and for the repair of body tissue. The digestibility of starches in pulses, both in terms of absolute amount digested and the rate at which it is hydrolyzed is lower than that of cereal starches. Therefore, high consumption of pulse-based foods leads to gassiness and other physiological discomforts in the stomach. The amylose content of pulses starches is ~30-40%, which is lower than cereals. Pulses contain more protein content (20-25%) compared to cereals. Pulses are rich in amino acid lysine compared to cereals.

These are the reasons behind the adding of cereals initially and later the pulses.

1.4 Modifications

A modification is done usually to make something work better. Modifications are necessary in certain conditions like when the patient is vegetarian, *asatmya* (non-conducive), non-availability, and aversion. Modifications can be made in the timing of *annakala*, *krama*, *ahara*, and *rasa*

1. *Annakala*: there was only two *annakala* in earlier period whereas now we eat thrice a day i.e. breakfast, lunch, dinner. Samsarjana can be altered into three *annakala*
2. *Krama*: among the six diets, *akruta yusha/mamsa rasa* and *kruta yusha/mamsa rasa* can be given depending upon the *agnibala* of the patient either as *akruta- akruta-kruta* or *akruta-kruta-kruta*.
3. *Ahara*: depending on the *satmyatha* of the patient changes can be made with
 - *Laaja* (puffed rice)
 - Soochi goduma (broken wheat)

- Oats
 - Ragi
 - Pongal (traditional diet of Tamil Nadu)
 - Corn/fried maize
4. *Rasa*: even though there is an order for the *rasasamsarjana* slight changes can be adopted for the patient like
- a. *amla, madhura* - cooked rice and *dadima/draksha* (pomegranate/ dry grape)
 - b. *amla, lavana*- salted mango or lemon with cooked rice
 - c. *kashaya, katu*- cooked rice with horse gram/ *kulatha* (horse gram)
- Depending upon the *rasa* predominant the food can be adopted

1.5 Conclusion

The word *Samsarjana karma* itself signifies its importance in correcting the *agni* and role of *samsarjana* as *paschat karma*. Rather than including it under *paschat karma*, through a thorough literature review we could understand that relevance of *samsarjana*. The various diet patterns explained in the texts can be advised in line of management of several diseases. It is advisable to recommend whenever there is diminution of *agni*. As most of the diseases is caused due to the *mandagni*, the *samsarjana krama* can be applied in all the diseases [24]. This is also adoptable in major diseases where *ama* is predominant. Due to practical difficulties, strictly following the classical diets may not be possible. Thus, certain modifications can be applied without altering the authentic principals of *samsarjana krama*.

Acknowledgments

I deeply express my gratitude to my Guru, Family and Teachers for their blessings. I sincerely thank my Friends & Colleagues for their support.

Author Contributions (Roles)

Each author has sufficiently participated in drafting the contents into an article.

Declaration of conflicting interests

The authors declare that there is no conflict of interest.

Funding (Financial Disclosure): No financial support received.

Ethical approval: Not Applicable

References

- ¹Caraka. Caraka Samhita revised by caraka and drdhabala with commentary Ayurveda dipika by cakrapanidatta, Varanasi chaukhambha krishnadas academy. pp 512
- ²Susruta Samhita with the nibandhasangraha commentary of Sri Dalhanacharya edited by Vaidya Jdavji Trikamji Acharya Chowkhamba Krishnadas Academy Varanasi, edition 2008, pp75
- ³Caraka. Caraka Samhita revised by caraka and drdhabala with commentary Ayurveda dipika by cakrapanidatta, Varanasi chaukhambha krishnadas academy. .pp 25
- ⁴Vagbhata. Ashtangahridayam, Sutrasthana, with commentaries sarvangasundara of Arunadatta and Ayurveda rasayana of Hemadri, Varanasi chowkhamba krishnadas academy pp 268
- ⁵ Caraka. Caraka Samhita revised by caraka and drdhabala with commentary Ayurveda dipika by cakrapanidatta, Varanasi chaukhambha krishnadas academy. .pp 707

- ⁶Vagbhata. Ashtangahridayam, Sutrasthana, with commentaries sarvangasundara of Arunadatta and Ayurveda rasayana of Hemadri, Varanasi chowkhamba krishnadas academy pp 268
- ⁷Susruta Samhita with the nibandhasangraha commentary of Sri Dalhanacharya edited by Vaidya Jdavji Trikamji Acharya Chowkhamba Krishnadas Academy Varanasi edition. pp550
- ⁸ Vagbhata. Ashtangahridayam, Sutrasthana, with commentaries sarvangasundara of Arunadatta and Ayurveda rasayana of Hemadri, Varanasi chowkhamba krishnadas academy pp 264
- ⁹Vagbhata. Ashtangahridayam, Sutrasthana, with commentaries sarvangasundara of Arunadatta and Ayurveda rasayana of Hemadri, Varanasi chowkhamba krishnadas academy pp 264
- ¹⁰Vagbhata. Ashtangahridayam, Sutrasthana, with commentaries sarvangasundara of Arunadatta and Ayurveda rasayana of Hemadri, Varanasi chowkhamba krishnadas academy pp 264
- ¹¹Vagbhata. Ashtangahridayam, Sutrasthana, with commentaries sarvangasundara of Arunadatta and Ayurveda rasayana of Hemadri, Varanasi chowkhamba krishnadas academy pp 264
- ¹²Caraka. Caraka Samhita revised by caraka and drdhabala with commentary Ayurveda dipika by cakrapanidatta, Varanasi chaukhambha krishnadas academy. .pp 167
- ¹³Caraka. Caraka Samhita revised by caraka and drdhabala with commentary Ayurveda dipika by cakrapanidatta, Varanasi chaukhambha krishnadas academy. .pp 167
- ¹⁴Susruta Samhita Sutra sthana with the nibandhasangraha commentary of Sri Dalhanacharya edited by Vaidya Jdavji Trikamji Acharya Chowkhamba Krishnadas Academy Varanasi edition. chapter 46 verses 366
- ¹⁵Vagbhata. Ashtangahridayam, Sutrasthana, with commentaries sarvangasundara of Arunadatta and Ayurveda rasayana of Hemadri, Varanasi chowkhamba krishnadas academy pp 264
- ¹⁶Caraka. Caraka Samhita revised by caraka and drdhabala with commentary Ayurveda dipika by cakrapanidatta, Varanasi chaukhambha krishnadas academy pp 268
- ¹⁷Caraka. Caraka Samhita revised by caraka and drdhabala with commentary Ayurveda dipika by cakrapanidatta, Varanasi chaukhambha krishnadas academy pp 730
- ¹⁸Caraka. Caraka Samhita revised by caraka and drdhabala with commentary Ayurveda dipika by cakrapanidatta, Varanasi chaukhambha krishnadas academy pp 730
- ¹⁹ Caraka. Caraka Samhita revised by caraka and drdhabala with commentary Ayurveda dipika by cakrapanidatta, Varanasi chaukhambha krishnadas academy pp 760
- ²⁰ Susruta Samhita with the nibandhasangraha commentary of Sri Dalhanacharya edited by Vaidya Jdavji Trikamji Acharya Chowkhamba Krishnadas Academy Varanasiedition. pp550
- ²¹Bouchard, J., Malalgoda, M., Storsley, J., Malunga, L., Netticadan, T., & Thandapilly, S. J. (2022). Health Benefits of Cereal Grain- and Pulse-Derived Proteins. *Molecules*, Volume 27 Issue. <https://doi.org/10.3390/molecules27123746>
- ²²Shahzad, R., Jamil, S., Ahmad, S., Nisar, A., Khan, S., Amina, Z., Kanwal, S., Aslam, H. M., Gill, R. A., & Zhou, W. (2021). Biofortification of Cereals and Pulses Using New Breeding Techniques: Current and Future Perspectives. *Frontiers in Nutrition, Nutrition and Sustainable Diets*, Volume 8 – 2021, <https://doi.org/10.3389/fnut.2021.721728>
- ²³Singh N. Pulses: an overview. *J Food Sci Technol*. 2017 Mar;54(4):853-857.. Epub 2017 Feb 14. PMID: 28303036; PMCID: PMC5336460. doi: [10.1007/s13197-017-2537-4](https://doi.org/10.1007/s13197-017-2537-4)
- ²⁴Caraka. Caraka Samhita revised by caraka and drdhabala with commentary Ayurveda dipika by cakrapanidatta, Varanasi chaukhambha krishnadas academy pp 705