World Journal of Pharmaceutical and Life Sciences
WJPLS
www.wjpls.org
SJIF Impact Factor: 6.129

A REVIEW OF PANDU VYADHI IN LIGHT OF NUTRITIONAL DEFECIENCIES IN INDIA, WITH SPECIAL REFERENCE TO PHYTIC ACID

***Dr. Sachin Ashok Naik**

Professor & HOD, Rognidan & Vikrutividnyan, Ayurveda Medical College, Karav, Vangani.

Corresponding Author: Dr. Sachin Ashok Naik
Professor & HOD, Rognidan & Vikrutividnyan, Ayurveda Medical College, Karav, Vangani.

Article Received on 28/04/2020 **Article Revised on 18/05/2020** **Article Accepted on 08/06/2020**

ABSTRACT

In Ayurveda we study Pandu Vyadhi with its nidanpanchak in detail. We have studied the disease which correlates todays Iron deficiency anaemia. There are total five types of Pandu Vyadhi out of which four are doshaj and fifth is caused by a habit of eating soil (Mrudbhakshan janya). Interestingly we find this type in gujarat in today's India. In India vegetarian diet is extensively followed. Interestingly in people with anaemia which is prevalent in India especially in women, diet need to be understood in addition with Ayurvedic study. The reason for it is phytic acid is present in vegetarian diet which binds with minerals and prevents bioavailability of the minerals hence a causative factor of anaemia. Here our main aim is to study Pandu and phytic acid and understand the impact on anaemic people and simple solution for the same. We know that phytic acid binds with minerals present in the diet and hamper the mineral uptake by humans who already are anaemic. Hence in spite of having mineral rich diet those patients remain anaemic. Hence medicines help only for course of the medication. Afterwards they may lack the minerals due to this reason as the same diet is continued.

INTRODUCTION

We have a rich heritage of Ayurveda which is a unique way of following a lifestyle to avoid getting the diseases and treat them if you get them.

Pandu is a major disease of Rasavaha srotas.

We will touch important aspects in light of dietary apects as well.

I definitely urge that we need to study different specialties and integrate our Ayurveda so as to benefit mankind.

Objective

Understand Prevalence and Burden of anaemia in India.

Here the objective is to understand nutrition as a hetu/causative factor and if possible any simple solutions.

Disease Prevalence in India-

Anaemia is widespread in India--58.6% of children, 53.2% of non-pregnant women and 50.4% of pregnant women were found to be anaemic in 2016, as per the NFHS. India carries the highest burden of the disease despite having an anaemia control programme for 50 years.[1]

DISEASE REVIEW

Pandu Roga

Historical Review: ™

Pandu Roga firstly mentioned in Rigveda and Atharvaveda by as "Halima" and "Harima" respectively. ™

This disease was described in ancient Hindu treatises like in Ramayana, Agnipurana, Garudapurana, Mahabharata. Management of Panduroga by Lauha Churna with Takra was mentioned in Garudapurana. Acharya Vagbhatt has mentioned this disease as the disease of diseases like '(Pando Shresthamayah)

Etymology

Etiology

Dietetic cause

Excessive intake of Kshara, Amla, Lavana, Ushna, Viruddha and Asatma food. *f* Large intake of Nispava, Masha, Pinyaka, Madya and Tila Taila.

Habitual cause

Day time Slumber, exercise as well as sexual intercourse even before the food is not properly digested. *f*
Vega Vidharana, excessive Vyayama.

Mental cause

Affliction of mind with Kama, Chinta, Bhaya, Krodha and Shoka. Iatrogenic, Improper administration of Pancha Karma.

Complication of other diseases *ƒ*
Raktarbuda, Raktapitta, Raktapradara, Jirna Jwara, Grahani, Arsha, Krimi.

Clinical features: *ƒ*
Features due to Rasa Dhatu Kshaya: Hridayaspandana (palpitation), Raktalpata (anaemia), Shrama (fatigueness), Karshya (emaciation) *ƒ*
Features due to Rakta Dhatu Kshaya: Varnakshaya (pallor), Twaksphotana (roughness of skin), Bhrama (giddiness), Shwasa (breathlessness). *ƒ*
Features due to Mamsakshaya: Karshya, Shrama, Gatrasada (prostration). *ƒ*
Features due to Medakshaya: Karshya, Twakrauksha, Swedabhava (absence of sweating) *ƒ* Features due to Asthikshaya: Shirnalomata (hair fall), Shrama, Gatrarauksha *ƒ*
Features due to Majjakshaya: Bhrama, Tama (fainting), Balakshaya (weakness) *ƒ*
Features due to Sukrakshaya: Panduta (pallor), Daurbalya (weakness), Gatrasada. *ƒ*
Features due to Ojakshaya: Shotha (oedema), Shrama, Gatrasada, Gaurava (heaviness), Balanasha, Varnanasha, Snehanasha (unctuousness)

Types: *ƒ*
According to Acharya Charaka – Vataja, Pittaja, Kaphaja, Sannipataja and Mridbhakshana Janya. *ƒ*
According to Acharya Sushruta – Vataja, Pittaja, Kaphaja and Sannipataja

Vataja Pandu: *ƒ*
Etiology: Vitiation of Vaata by large intake of Vata - aggravating diet. *ƒ*
Features: Krishnapanduta (black and pale yellow complexion), Rukshata (ununctuousness)
Angamarda (malaise), Ruja (pain), Kampa (tremor), Anaha (constipation), Balakshaya (weakness)

Pittaja Pandu: ***ƒ***
Etiology: If a person of Pitta Prakriti takes recourse to Pitta- aggravating diet and regimen. *ƒ* Features: Haritabha (yellow complexion), Jwara (fever), Daha (burning sensation), Trishna (excessive thirst), Murcha (faints), Pitamutra (yellow micturation), Amla-udgara (sour eructation), Tama (fainting)

Kaphaja Pandu: *ƒ*
Etiology: Vitiation of Kapha by Kapha-aggravating diet and regimen. *ƒ* Features: Gourava (heaviness), Tandra (drowsiness), Chardi (vomiting), Svetaababhasata (white complexion), Praseka (salivation), Lomaharsha (horripilation), Shwasa (breathlesseness), Kasa (cough), Aruchi (anorexia).

Sannipataja Pandu: *ƒ*
Etiology: If a person indulges in all types of unwholesome food. *ƒ*
Features: Symptoms and signs of vitiation of all the three Doshas.

Mrid Bhakshanaja Pandu: *ƒ*
Etiology: Habitual indulgence in eating clay aggravates one of the three Doshas. *ƒ*
Features: Shuna-ganda-akshikuta-bhru (swelling in the check, eyelids, and eye brows) o Shuna-pada-nabhi (pedal and umbilical oedema), Atisara (loose motions), Krimi-kostha (worm infestation)[2]

Iron Deficiency Anaemia
Historical Review: In 1554, Han Lounji had described the disease by the name of "Colorosis"
In 17th cen. A.D. application of the name of anaemia was started. ™ In 1829, it was defined clearly with specific definition.

Definition: Iron deficiency anaemia has been defined as iron store depletion refers to an imbalance between normal physiologic demands such as body growth, menstrual blood loss and pregnancy and the level of dietary iron intake.

Etiology: Defective Intake: Children, psychiatric patients, patients having anorexia. *ƒ* Defective Absorption: Gastrectomy, gastrojejunostomy, sprue syndrome. *ƒ*

Excessive Demand: Growing children, female during reproductive years, thyrotoxicosis *ƒ* Excessive Loss: Hookworm anaemia, bleeding piles, hiatus hernia, iron sequestration, pulmonary haemosiderosis, menorrhagia, recurrent haematemesis and melaena, recurrent blood donation, acute and chronic haemoglobin urea. Iron Balance18: An adult male on a balanced diet will ingest approximately 15 to 20 mg of iron/day, while the adult female will ingest 10 to 15 mg/day. In the male only 1 to 2 mg needs to be absorbed to replace the iron lost from desquamation of skin and mucosal cells. The adult pre-menopausal female needs to absorb more from the diet to make up for menstrual blood loss. The same is true for the frequent blood donor. Infants, children and adolescents may be unable to maintain normal iron balance because of the increased demands of body growth and much lower dietary intakes of iron. This is also true for pregnant women. During the last two trimesters of pregnancy, the daily iron requirement increases to 3 to 5 mg, a level that can not be supplemented unless the diet is rich in heme iron or the women receives an iron supplement. Clinical Features: *ƒ* General: Weakness, fatigue, lassitude, oedema, pallor, dry skin, lustreless hair, white sclera.

Cardiovascular: Palpitation, anginal pain, sinus tachycardia, collapsing pulse, dancing carotids, engorged neck veins, haemic murmur, congestive cardiac failure. *ƒ* Respiratory: Breathlessness G. I. System: Anorexia, acidity, heart burn, palpable spleen and liver. *ƒ* Neurological: Dizziness, tingling, numbness, insomnia, dimness of vision, forgetfulness, lack of concentration.

Reproductive: Amenorrhoea, menorrhagia, abortion. Laboratory investigation19:

Blood examination: Hb%: Below 11.5g / dL RBC count: Usually follows Hb% MCV: 50-80 fL MCH: 15-26 Pg MCHC: 24-30 g/dL Peripheral blood film shows hypochromia, anisocytosis, poikilocytosis.

Blood biochemistry: Serum iron: Below 50 µg/dL Iron binding capacity: More than 360 µg/dL Percent sefuration of transferrin: Below 20% Serum ferritin: Below 15 µg/L Stages of Iron Deficiency20: 1. Iron store depletion: This is identified using the serum ferritin level and marrow iron stain. Ferritin level: Less than 20 µg/L Visible iron stores: 0 to 1+ 2.

Iron-deficient enythropoiesis: Serum Ferritin level: Below 15 µg/L Serum iron level: Below 60 µg/dL TIBC: Increases Percent saturation of transferring: Less than 20% Haemoglobin level: 10 to 12 g/dL 3. Iron deficiency anaemia: Serum iron: Below 30 µg/dL TIBC: More than 400 µg/dL

Percent saturation of transferrin: Below 10% Serum ferritin level: Below 15 µg/L Haemoglobin level: Below 10g/dL

General line of treatment:™

The cause of anaemia should be treated as far as practicable. When the haemoglobin level is below 40%, blood transfusion is to be given. When the haemoglobin level is more than 40% then iron suppliment should be given.[3]

Nutritional Aspect

The centrality of nutrition for better health outcomes is well recognized. The nutritional status of individuals, families, and communities depends on the food they consume. This is in turn determined by the availability, acceptability, and affordability of food. Thus, improving the health of the people requires improving their nutrition through better and more nutritious food. This is where agriculture plays an important role not only as a means of producing diverse, nutritious, safer food that is affordable but also through pathways like improved household access to nutritious food, improved income, women's empowerment.[4]

The problem of nourishment is a worldwide; it has been assumed gigantic proportion in the underdeveloped and developing countries. Most of the countries in Asia are either underdeveloped or developing countries. India is one of them and per capita income in India is meagre. An average individual lives below the poverty line. The main cause of Anaemia is malnutrition. People's diet is generally deficient in essential minerals, vitamins.

The commonest type of Anaemia that we see in practice is iron deficiency Anaemia. Children, and females suffer the most from this disease. Most of these patients could be easily and cheaply treated with single oral iron preparation, that are available in Ayurvedic classical books. These recipes are used in our country since the days of Charaka and Sushruta.

World's other traditions of medicine like Roman, Greek, Egyptian, Masopotamian we can derive references of Pandu.

India has started mission called as Anaemia mukt bharat5.

India has put up a target till 2022 to reduce anemia burden and devised AMB ranking for states.[5]

Influence of phytate on intestinal mineral absorption

Health authorities from all over the world universally recommend increasing consumption of whole grains and legumes for health promoting diets. Whole grain foods are valuable sources of carbohydrates, dietary fibre, numerous bioactive compounds, vitamins, minerals and trace elements which are in short supply in many countries.

Mineral malnutrition is a global problem affecting industrialised and developing countries as well. Children, infants and women at childbearing age are primarily affected**.**

Under nonvaried and nonbalanced dietary conditions, phytate may affect the bioavailability and in consequence the status of iron, zinc and calcium. It should be stressed that in many countries whole grain cereals and legumes are among the most important food sources for minerals and trace elements but also contain high amounts of phytate and polyphenols.

Thus, when advice is given for good dietary sources of minerals and trace elements, various interactions between the minerals and trace elements and phytic acid have to be taken into consideration to ensure high bioavailability and adequate supply.[6]

Soaking, malting and germination of cereals

Soaking is a commonly used method as pretreatment of germination, malting, etc. Soaking may last for short periods (15 – 20 min) or long periods (12 – 16 h). The soaking medium used depends upon the type of seed. In the household, cereals and legumes are most often soaked in water overnight. At optimal conditions for phytases (558C, pH 4.5 – 5.0) phytate might be reduced effectively by soaking. As phytate is water soluble, some phytate removal can be obtained by discarding the soak water. Phytase activity increases considerably during germination, but there are great differences between different cereals. Barley has shown an increase of phytase activity up to 11 times of the original one, while phytases in wheat, rye and oats increased 4.5, 2.5 and 9 times from the original activity. The phytate content was reduced by 16% in barley, and 30% in wheat and rye and

17% in oats. In malted wheat, rye and barley, ground and soaked for 2 h, almost total hydrolysis of phytate was obtained. Oats needed a longer time (up to 17 h) to reach complete reduction. Optimal conditions for hydrothermal processes of whole kernels of barley to hydrolyse phytate up 95 – 96% have been developed, using two wet steps and two dry steps, followed by drying. Degradation seems to be highest in the scutellum cells and less in the aleurone layer due to changes in the microstructure of the phytate globoids in the barley during hydrothermal processing.[7]

Soaking and germination of legumes Supplementation of cereals with legumes rich in protein is considered to be effective to fight protein-calorie malnutrition in many developing countries.
A common method of processing legumes to reduce phytate is soaking and germination.

As these foods are the main sources for protein in many developing countries, it is important that phytate is reduced to a minimum to obtain bioavailability as high as possible for both protein and minerals. Before pulses and legumes are consumed they are dehulled and prepared with subsequent soaking, germination, fermentation, roasting and autoclaving. The decrease in phytate content due to germination has shown to be highest in pigeon peas (65.8%), followed by chickpeas (64.1%), bean curd (40.6%), soybeans (38.9%) and mung beans (37.2%).

Other studies on beans [17, 286] have shown considerably lower reduction than reported in this study. Even if fermentation has been shown to result in a decrease of phytate content, this method was less effective than germination. It should however be pointed out that these two methods are the most effective ways to lower the phytate content in legumes and pulses. Soaking of peas for up to 12 h decreased the content of phytate no more than 9% while other studies showed no effect of soaking (16 h, 228C) on the phytate content in peas, lentils or beans.

A small reduction could be caused by leaching phytate into the soaking water. The most effective way of reducing phytate degradation was at pH 7.0 and 458C. Germination results in the reduction of phytate in peas – the longer the germination period, the greater the phytate degradation. While a loss of 6 – 8% of phytic acid was observed after 12 h, a loss of 67 – 83% occurred after 48 h. It is recommended to dehull and soak legumes before consumption to reduce the phytate content and thereby increase the nutritional quality of proteins in these foods. With quinoa seeds it was also demonstrated that soaking, germination and lactic acid fermentation resulted in reduced phytate content up to 98%.

Fermentation and bread making- Fermentation has been used for processing and preservation of foods for a long time in history. Due to production of lactic acid and other organic acids in the dough pH is lowered, phytases activated and phytate degraded. Part of the phytate reduction is due to the action of endogenous phytases, but exogenous microbial phytases may also be active in phytate degradation during fermentation. It seems as if phytases normally present in cereals are of greater importance for phytate reduction, than yeast phytases added to cereals. Different yeast species have been identified as possible sources of phytase, and certain bacteria [295, 296] may also provide viable sources of exogenous phytase. Fermentation of maize, soybeans and sorghum has been shown to reduce the phytate content in foods. It has been demonstrated that combined germination and lactic acid fermentation of white sorghum and maize cruels can result in almost complete degradation of phytate.[8]

Substitution of a low–phytic acid grain in a maize-based diet is associated with a substantial increase in zinc absorption.
The daylong consumption of a maize diet with a typical high–phytic acid content and a high molar ratio of phytic acid to zinc is associated with a low fractional absorption of zinc. A low phytic acid intake and a low molar ratio of phytic acid to zinc is associated with a substantially and significantly greater fractional absorption of this micronutrient.[9]

Phytate degradation improves iron absorption from cereal porridges prepared with water but not with milk, except from high-tannin sorghum.[10]

CONCLUSION

We can arrive at following conclusions

1. Pandu is a disease of deficient nutrition giving rise not only to iron deficiency anaemia but also other mineral deficiencies.
2. Bioavailabale minerals are important for treating malnutrition. Phytic acid hampers bioavailability of minerals hence for vegetarians one need to soak,germinate the cereals before consumptions to reduce phytate binding.
3. We can use specific asavas like lohasav and arishtas in daily routine especially for iron deficiency anaemia.

REFERENCES

1. https://www.indiaspend.com/improve-womens-education-health-services-to-reduce-indias-anaemia-burden-worlds-highest/#:~:text=Anaemia%20is%20widespread%20in%20India,control%20programme%20for%2050%20years.
2. Charak Samhita & Sushrut Samhita
3. Harrisons Manual of Medicine-16th Edition, API textbook of Medicine-volume I,II,III, Davidsons Principle & Practice of Medicine
4. https://a4nh.cgiar.org/2019/03/19/from-food-security-to-nutrition-security-in-india-a-food-systems-perspective/

5. https://anemiamuktbharat.info
6. https://wiebaktmee.nl/cms/pdf/Schlemmer%20_Mol_Nutr_Food_res_2009_Phytate_in_foods_and_significance_for_humans.pdf
7. https://wiebaktmee.nl/cms/pdf/Schlemmer%20_Mol_Nutr_Food_res_2009_Phytate_in_foods_and_significance_for_humans.pdf
8. https://wiebaktmee.nl/cms/pdf/Schlemmer%20_Mol_Nutr_Food_res_2009_Phytate_in_foods_and_significance_for_humans.pdf
9. https://academic.oup.com/ajcn/article/76/3/556/4677421
10. https://academic.oup.com/ajcn/article/77/5/1213/4689822