

AN OBSERVATIONAL STUDY TO ASSESS THE ETIOLOGICAL FACTORS IN PATHOGENESIS OF PANDU ROGA

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ABSTRACT

Pandu vyadhi is incorporated in *Rasapradoṣaja vyadhi*, when there is hypo-functioning of *Jatharagni*, improper *Anna-rasa* is produced that leads to the formation of abnormal *Rasa* and will consequently produce abnormal and deficient *Rakta* which leads to *Kshaya* of other *Poshya* and *Poshaka Dhatus* of the body. Food or diet plays the crucial role in the normal development and maintenance of the different *Dhatus* of body. Malnutrition still affects over 1 billion people worldwide. According to *Ayurveda*, it is not only restricted upto *Apatarpanajanya* disease but it also included in *Samtarpanajanya Vikara*, such as intake of non nutritional calories such as cookies, potato chips etc leads to malnourishment even though they consume enough calories. there are many social causes contributing to the development of *Pandu* such as poverty, illiteracy, ignorance, overcrowding, large family size, poor maternal health, faulty feeding, cooking and cultural practices etc. which are very common now a days. The main objective of the study is to evaluate and analyze the etiological factors of *Pandu Roga*, for this purpose an observational study was done on 30 patients of *Pandu*, based on demographic data, *Aharaja*, *Viharaja*, *Mansika nidana*.

Keywords: *Pandu roga*, Nutritional deficiency Anemia, Dhatu, etiological factors

INTRODUCTION

Pandu vyadhi is included in the list of diseases caused due to vitiation of *Rasavaha srotasa*; being a *Rasapradoṣaja vyadhi*, vitiation of *Rasa dhatu* eventually leading to vitiation of further *Dhatus* is well understandable. Food or diet plays the crucial role in the normal development and maintenance of the different *Dhatus* of body. Nutritional deficiency Anemia is a global problem, more so in developing countries,

resulting from changing global nutrition landscape, influenced by economic growth and urbanization. Globally about 3.6 billion people are suffering from this. In India, it is very high among nutritionally vulnerable groups such as infants, children and women especially during pregnancy because of low dietary intake, poor availability of iron and chronic blood loss

due to worm infestation because of poor hygiene and contaminated water.

In *Ayurveda* causes of *Pandu Roga* are described in details e.g. *Asatmya bhojana* or *viruddha bhojana* (e.g. milk and biscuit is *virudha* as it contains soda) may inhibit normal process by antistubstance or *ama* formation and may lead to disturbance of the digestive and assimilative process. Excessive activity in the form of *ativyayama*, *ativyavaya*, *shramandhikya* causes excessive caloric output which out balances the intake of calories. *Kama*, *Krodha*, *Bhaya*, *Chinta* and *Shoka* like *manasa bhavas* are the major causes of *Pandu roga*¹. If a person takes balanced diet even at proper time but with *chinta* or worries, the digestive functions are disturbed this results in *mandagni*. When there is hypo-functioning of *Jatharagni*, improper *Anna-rasa* is produced. Improper *Anna-rasa* leads to the formation of abnormal *Rasa* and will consequently produce abnormal and deficient *Rakta* which leads to *Kshaya* of other *Poshya* and *Poshaka Dhatus* of the body. In this series, ultimately there is diminution of the vital essence i.e. *Ojus*. As a result of above, the individual becomes *Nihisara* (insipid) and *Pandu* is produced.

Panduroga is developed as a result of imbalance and variation of *Tridoshas* due to *Samtarpanajanya hetvas* or *Apatarpanajanya hetvas*. According to *Ayurveda*, it is not only restricted upto *Apatarpanajanya* disease but it also included in *Samtarpanajanya Vikara*², and practically it also found in overnutralated people, who take imbalanced diet rich in fat but deficient in vitamins and other minerals. Globalization of trade and marketing of food products are changing dietary habits in the direction of less healthy choices. Branded products like chips, soft drinks, noodles etc attract people, especially children this leads to excessive use of non nutritional products such as junk food, canned and processed food (processed foods are extremely low in essential nutrients compared to whole, unprocessed food, and it may contain trans fat, added sugar and sodium that is unhealthy and causes *samtarpan* or obesity rather than proper nutrition), readymade food as they are available everywhere and easy to prepare. These factors can be considered under

Samtarpanajanya hetvas in present era. There are many social causes contributing to the development of malnutrition or *Aptarpanajanya hetvas* such as poverty, illiteracy, ignorance, overcrowding, large family size, poor maternal health, faulty feeding, cooking and cultural practices etc, which are very common now a days. Malnutrition needs to be urgently addressed because under nutrition kills in early life, and it can also lead to increased risk of NCDs and death later in life³. Keeping the gravity of the situation, the present study has been undertaken to clinically explore the etiopathogenesis of *Pandu roga*.

AIM & OBJECTIVES

1. To assess the etiopathogenesis of *Pandu Roga*

MATERIAL & METHODS-

PLAN OF STUDY

a) Selection of patients-

1) Total 30 Patients randomly selected from OPD/IPD department of *Roga nidan Rishikul* Campus UAU Haridwar having chief complaints described in *Pandu* fulfilling the inclusion criteria were registered for the present study.

2) All the cases registered for the study was then evaluated clinically and investigated thoroughly. *Dashwidha Pariksha* of the Patients was done.

b) Type of study - Observational study.

c) Inclusion criteria-

1. Patients having classical features of *Pandu*.
2. Patients with Hb% Concentration less then 12gm/dl (for either sex)⁴.
3. Patients between the age group of 16-60 years of age.

d) Exclusion criteria-

1. Hb concentration less than 6gm%.
2. Patients having haemorrhoids, peptic ulcer, malignancy, blood dyscrasias e.g Thalassaemias etc. hemoglobinopathies e.g sickle cell anaemia, Hb-S disease etc.
3. Pregnant females and lactating mothers.
4. Patients having positive stool investigation report for parasite for the clinical study
5. Prediagnosed patients of Malabsorption syndrome.

e) Investigation-

1. Basic hematological investigations like Hemoglobin estimation, R.B.C count, PCV to assess the severity of Anemia.
2. Other routine hematological investigations like blood indices- MCH, MCV, MCHC, Peripheral

- blood smear and ESR helped to know the cause and type of anemia.
3. Stool examination- for detection of intestinal helminthes or their ova, cystic forms to exclude the patients of Krimija Pandu.

OBSERVATION-

Table 1: Epidemiological Data

AGE(years)	No. of patients	Percentage (%)
16 – 30	13	43.3%
31 – 45	16	53.3%
46 – 60	01	3.4%
SEX	No. of patients	Percentage (%)
Female	26	86.7%
Male	4	13.3%
RELIGION	No. of patients	Percentage (%)
Hindu	26	86.7%
Muslim	4	13.3%
OCCUPATION	No. of patients	Percentage (%)
Service	4	13.3%
Labor	1	3.3%
House wife	12	40%
MARRITAL STATUS	No. of patients	Percentage (%)
Married	24	80%
Unmarried	6	20%
SOCIOECONOMIC STATUS	No. of patients	Percentage(%)
Upper middle	6	23.4%
Middle	15	50%
Lower middle	7	23%
Very poor	2	6.6%
EDUCATION	No. of patients	Percentage(%)
Graduate	6	20%
SSC	6	20%
HSC	10	33.3%
Primary	3	10%
Illiterate	5	16.7%

Epidemiological data of 30 patients is depicted in table no. 1.

Table 2 - *Vaiyaktika itivritta* (personnel history) wise distribution

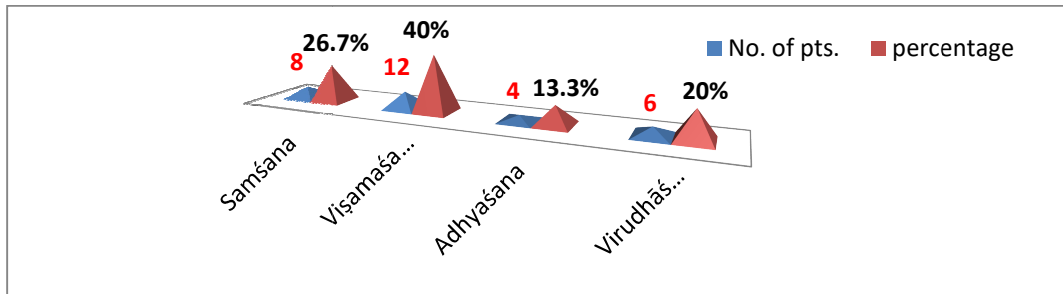
MENSTRUAL HISTORY	No. of female patients	Percentage(%)
Heavy Bleeding	10	38.4%
Scanty	6	23%
Normal	7	27%
Menopause	3	11.6%
APPETITE	No. of patients	Percentage (%)
Poor	15	50%
Moderate	6	20%
Good	9	30%
AGNI	No. of patients	Percentage (%)
<i>Sama</i>	2	6.7%

<i>Vishama</i>	12	40%
<i>Manda</i>	16	53.3%
KOSTHA	No. of patients	Percentage (%)
<i>Mridu</i>	3	10%
<i>Madhya</i>	14	46.7%
<i>Krūra</i>	13	43.3%
NIDRA	No. of patients	Percentage (%)
Sound	18	60%
Disturbed	12	40%
Irregular	0	0%
NATURE OF WORK	No. of patients	Percentage (%)
Sedentary	6	20%
Moderate	10	33.3%
Heavy	14	46.7%

OBSERVATION OF COMMON NIDANA:

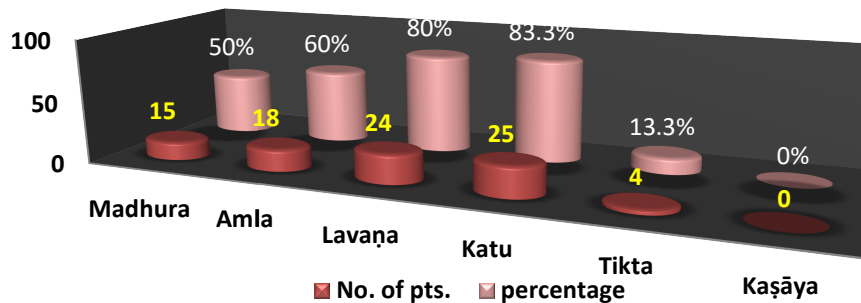
*Ahara*ja Nidan -

Chart 1 – Dietic habit wise distribution



Dietic Habit wise distribution of 30 patients is depicted in Chart no. 1.

Chart 2 – Dominant Rasa indulgence wise distribution



Indulgence of Dominant Rasa wise distribution of 30 patients is depicted in Chart no. 2.

Table 3: Diet pattern wise distribution

DIET PATTERN	No. of patients	Percentage (%)
Vegetarian	20	66.7%
Mix	10	33.3%

Diet pattern wise distribution of 30 patients is depicted in table no. 3.

Table 4: Consumption of Tea wise distribution

Consumption of Tea	No. of patients	Percentage (%)
1-2 cups/day	7	23.4%
3-4 cups/day	13	43.3%
5-7cups/day	10	33.3%
Absent	0	0%

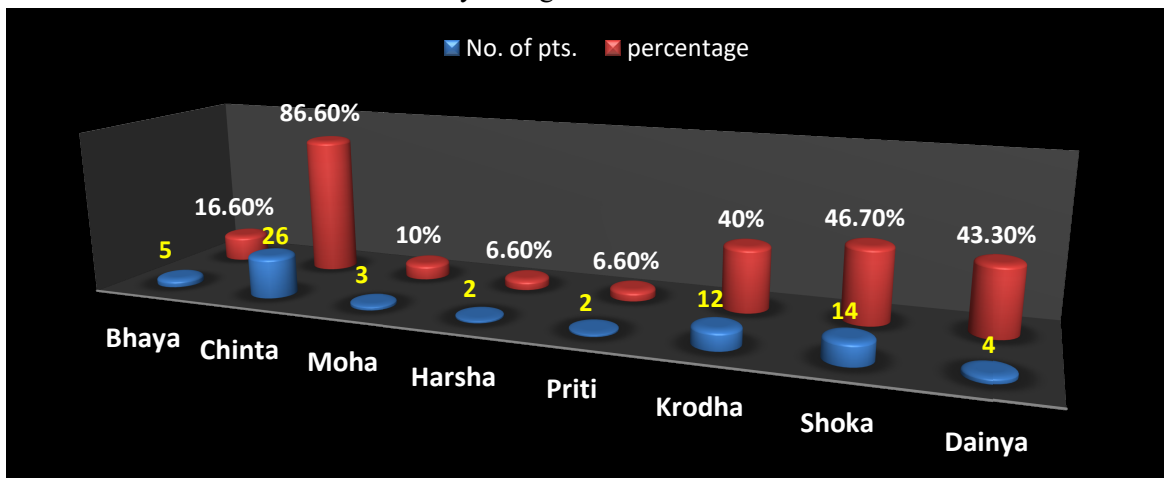
Consumption of Tea wise distribution of 30 patients is depicted in table no. 4.

Table 5: Viharaja Nidan wise distribution

Diwaswapa	No. of patients	Percentage (%)
Present	20	66.7%
Absent	10	33.3%
Vidagdhe Anne Diwaswapa	No. of patients	Percentage (%)
Present	16	53.3%
Absent	14	46.7%
Ativyayama	No. of patients	Percentage (%)
Present	12	40%
Absent	18	60%
Vegavidharana	No. of patients	Percentage (%)
Present	16	53.3%
Absent	14	46.7%

Viharaja nidan wise distribution of 30 patients is depicted in table no. 5.

Chart 3 – Psychological status wise distribution



In Psychological Status of the Patients, maximum i.e. 86.6% patients *Cinta* was found. In 46.7% *Shoka* was found and *Krodha* was found in 40% patients. While, *Bhaya* was observed in 16.6% of Patients. *Dainya* & *Moha* was found in 13.3% & 10% patients respectively. (chart 3)

DISCUSSION

AGE – In this study, disease is common in middle aged group. The probable cause for increased prevalence in this age group might be that, this age group patients are prone to mental stress, due to which proper nutritional diets may be ignored, excessive exercises, irregularity in diet and improper *Viharas* (*Atapa*

sevana, *Ratrijagarana* etc.) and it's also the time of maximum physiological growth, menstruation and child bearing age. Accelerated development, hormonal changes, unhealthy food and starting of menstruation in girls are major causes of iron deficiency anemia in adolescence period. During this period, physical changes affect the nutritional needs from the body

while changes in lifestyle may affect eating habits and food choices. According to WHO, Women of reproductive age are the most at risk for anemia (15–49 years)⁵.

SEX – Sex incidence in *Pandu roga* in the present study was found as incidence in male was 13.3 % and in females it was 86.7 % of the cases. Thus, we can say that this disease is more prevalent in females. Reason behind this may be firstly that females are more inclined towards spicy, sour (*amla*) and bitter (*tikshna*) *ahara* rather than a balanced diet. Secondly regular loss of blood due to menstruation makes them more prone to develop *Pandu*. Thirdly most of the female patients had the history of blood loss due to one or other reason during their delivery and that may also be one of the reasons of females being more in number.

Furthermore, hormone testosterone is responsible for raising the red blood cell count, which stimulates erythropoietin (EPO) that helps boost the hemoglobin concentrations in adult men⁶. The data of National Family Health Survey-3 shows that anemia is particularly high 55.3% in all women⁷.

RELIGION – Religion wise maximum patients 86.7% patients were belonged to Hindu religion. The reason behind this might be that Hindus are more inclined toward vegetarian diet in comparison with muslims and now a days due to rising prices of food stuffs and non availability of green leafy vegetables, diminished quality of fruits and vegetables by excessive use of insecticides and pesticides. Presence of interfering factors of iron absorption like phytates of wheat etc. a person from lower income group is unable to afford the total ingredients of a balanced diet and this deficient diet in long run give rise to *Pandu*. Muslims on the other hand got all their nutrition in their non vegetarian diet. Iron which is available from vegetarian sources is non-heme iron which has less bioavailability⁸.

EDUCATION – In the present study, it was found that anemia increases steadily with decrease in the level of educational attainment. This denotes that they may be less cautious about the causes & complication of the disease, their nutritional requirements and benefits of balance diet.

Educated women are not only able to take care of herself but also a entire family, if she knows about healthy cooking habits such as avoidance of repeated overheating and intake of stale (*paryuṣita*) food, over washing of food as nutritive components got lost, food is to be taken while it is hot etc, as there is a saying that “if you have a perfect kitchen you will not need a pharmacy” thus, nutrition deficiency can be prevented.

OCCUPATION – On considering the nature of occupation, it was found that maximum i.e. 40% were housewives and 20% were students. Our findings also show that being a housewife is an independent risk factor for anaemia. The reason might be excessive labor, improper diet, and also most housewives depend solely on their husbands earnings for their financial needs. In the cases of house hold wives, it was observed that *Diwaswapna* was done by most of the patients which also leads to *Agnimandya* then *Dhatvagnimandya* then *rasarakta dhatudushti* then *Pandu*. And housewives do not follow a proper diet schedule in an urge to finish the household work first that leads to malnutrition. As well as they are careless towards their own care and always worrying for the family responsibilities this leads to mental tensions. Students are prone because, due to hectic atmosphere of competition stress is very common which leads to unhealthy life style behaviors i.e. inadequate eating behavior in terms of quality and quantity of food.

SOCIO-ECONOMIC STATUS – Analyzing the socio economical status, the incidence was higher in middle class i.e. 50% & 23% of Lower middle class. This may be because middle class people are attracted towards modernized form of food like pizza, burger, French fries etc. junk food which are less nutritious. Now a day’s luxuries have converted into necessities struggling for gaining these facilities middle class has invited stress in their lives which has a great impact on initiation, progression & exacerbation of the disease.

The patients from lower middle class can’t afford expensive food; vegetables as well as medicines for this chronic disease, Moreover, housewives of middle class due to poor pre-post natal care are more prone to this disease. The poor people are totally unable to

afford the proper diet and hence they suffer from this disease. The reason for acquiring this disease in upper class community may be due to excessive indulgence of fast foods, dairy products (Which reduce Iron absorption) and habit of skipping breakfast and meal due to their busy life style.

MENSTRUAL HISTORY – The table reveals that most of the patients i.e. 38.4% were having heavy bleeding. Due to excessive Blood loss or Irregularities in Menstruation results in increased iron losses in those with menorrhagia are more likely to suffer from iron deficiency and anemia. However women with normal menstruation, if don't take sufficient Iron containing foods may develop IDA.

In an study it was found that, Usage of more than 2 sanitary pads in a day during menstruation (OR=3.67, 95% CI 2.30-5.88; P=0.000) and duration of menstrual bleeding more than 5 days were found to be risk factors for anaemia⁹.

NATURE OF WORK – Data shows maximum 46.7% patients were doing heavy work. 33.3% patients were doing moderate work. And 20% of the patients have sedentary life styles. Excessive work might be the cause of *Vātaprapoka* and *Dhātukṣaya* leading to *Pandu*.

Several mechanisms are generally accepted to cause iron loss during exercise:-

Exercise-induced haemolysis, due to mechanical forces and oxidative stress;

Exercise is known to increase inflammation markers, especially that of interleukin-6 (IL-6) that activates hepcidin expression, In turn, elevated hepcidin levels reduce dietary iron absorption and sequestration of iron in macrophages.

Blood loss in the gastrointestinal and urinary tract, due to microscopic lesions by the reduced visceral circulation during exercise;

Increased pro-inflammatory markers, occult blood loss in urine and faeces, and a decreased haptoglobin level are observed in patients immediately after intensive training (<24 hours)¹⁰. Iron loss due to excessive sweating has also been proposed as an underlying mechanism.

AGNI – Maximum patients i.e. 53.3% were having *Mandagni*. 40% were having *Vishmagni*. The ham-

pered *Agni* ultimately leads to *Agnimandya*, which leads to *Dhatvagnimandya*. These also produce *Dhatushaithilya* or *Dushti* and may also cause the vitiation of *Dosha*. *Mandagni* and *Vishmagni* create *Ama* production and improper *Rasa Dhatu* formation which is the foremost step in development of *Pandu*.

DIET PATTERN – Maximum i.e. 66.7% patients were having vegetarian diet, As mentioned above Iron which is available from vegetarian sources is non-heme iron which has less bioavailability. The increased tannin and phytate content with vegetarian diet inhibit iron absorption. Also egg yolk protein reduces the iron bioavailability when the resistant protein, phosvitin, combines with dietary iron and forms an insoluble iron complex in the small intestine¹¹, This type of food is normally preferred by vegetarians.

DIETIC HABIT – It is evident from the data that maximum patients i.e. 40% were having Dietic habit of *Vishmasana*, *Vishmasana* cause *Agnimandya* and ultimately, *Dhatvagnimandya*. These also produce *Dhatushaithilya* or *Dushti* and *doshaprakopa* which is the root cause of disease.

Irregular meal-pattern increases premeal and postmeal ratings for hunger and reduces fullness which suggested that by the end satiety was reduced as well¹². So, they consume calories, they fill up on “empty” non nutritional calories such as cookies, potato chips etc, which lacks nutrition and interfere *dhatu poshana*.

DOMINANT RASA – Maximum patients i.e. 83.3% were taking *Katu Rasa* dominant diet. 80% & 60% were taking *Lavana & Amla Rasa* dominant diet daily. According to classics, excessive use of *Lavana Rasa* causes *Pitta Prakopa* (vitiation of *Pitta*)¹³. *Katu, Lavana and Amla Rasa* has already indicated as *Nidanas* of *Pandu Roga* and they directly vitiate *Pitta* and *Rakta* and lead to *Raktapradoṣaja vikaras* like *Pandu*. *Acarya Caraka* has described the outcome of excessive use of *Amla* and *Lavana Rasa*.

*Atī Amlarasa Sevana*¹⁴

Excess intake of *Amla, Lavana, Katu, Tikshṇa, Ushna, Vidahi* as well as flavors used in Junk foods causes serious injury and damage to intestinal mucosa and prevents absorption of nutrients.

CONSUMPTION OF TEA – Majority of the patients were addicted to tea. Polyphenolic compounds present in tea also strongly inhibit dietary non-haem¹⁵ and haem¹⁶ iron absorption as well, possibly through formation of a non-transportable polyphenol-iron complex.

DIWASWAPA (day sleeping) – In maximum 66.7% patients *Diwāswapa* was found, which vitiates all three *Doshas* as per Sushruta¹⁷ and especially *Kapha* and *Pitta* as per *Acharya Charaka*¹⁸ *kapha prakopa* produces *Agnimandya* that leads to incomplete digestion and *amotpatti*. This *ama* is absorbed in *rasa*, *rakta* and other *Dhatus* ultimately producing *Dhatu aposhana* and *Pandu*.

VEGADHARANA (suppression of urges) – 53.3% patients were having habit of *Vegavidharana*, Since in this study majority of the patients were female, and there is a general tendency of females to suppress their urges due to busy schedule, etc., such a habit leads to *Vata prakopa* (vitiating of *Vata*) and diminution of *Agni*.

PSYCHOLOGICAL STATUS – *Chinta* (anxiety) was profoundly i.e. 86.6% found in patients followed by *Shoka* and *Krodha* (anger). *Chinta* weakens the digestive power and that ultimately is responsible for vitiating of *Rasavahasrotasa* resulting in *Aruchi* (anorexia), *Angamarda* (body ache), etc¹⁹. *Krodha* is also responsible for *Jatharagni Mandya* and leads to *Ama* formation²⁰ and is also a symptom of *Pitta Prakopa*, the main *Dosha* involved in *Pandu*.

The higher risk of anemia among depressed participants may be due to a number of factors. First, the more severe the underlying disease, the greater the chance that mucosal damage and subsequent bleeding will develop²¹. Second, the increased sympathetic tone, observed among depressed persons, can regulate bone marrow microenvironment, affecting erythropoiesis²². Third, anemia can represent a consequence of malnutrition among depressed persons²³.

CONCLUSION

Pandu vyadhi is caused due to improper formation of *Dhatus* (bodily tissues), *Aharaja*, *Viharaja* and *Mansika nidana* causes hypo-functioning of *Jatharagni* that causes improper production of *Anna-*

rasa. Improper *Anna-rasa* leads to the formation of abnormal *Rasa* and will consequently produce abnormal and deficient *Rakta* which leads to *Kshaya* of other *Poshya* and *Poshaka Dhatus* of the body. In this series, ultimately there is diminution of the vital essence i.e. *Ojus*. As a result of above, the individual becomes *Niharsa* (insipid) and *Pandu* is produced.

In the present study it was found that *nidana* described in *Ayurveda* for *Pandu Roga* are very much relevant to present era, as due to busy schedule, hectic atmosphere of competition, work load and evaluation of technologies the quality and quantity of food and proper nutrition to *Dhatus* is compromised.

The patients were instructed to follow the *Pathya Apathaya* regarding food, food habits, and life style to the extent possible, because they play a major role in causation and prevention of disease. Thus *Nidana parivarjana* helps in maintaining quality of life and preserves health status.

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