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THE CONCEPT OF ENVIRONMENT IN LAGHUTRAYI WITH SPECIAL REFERENCE TO HEALTH AND DISEASE.

DR SHIV SHANKAR PATHAK* AND DR. RANI SINGH**

Declaration

The Declaration of the authors for publication of Research Paper in The Indian Journal of Research Anvikshiki ISSN 0973-9777 Bi-monthly International Journal of all Research: We, *Shiv Shankar Pathak and Rani Singh* the authors of the research paper entitled THE CONCEPT OF ENVIRONMENT IN LAGHUTRAYI WITH SPECIAL REFERENCE TO HEALTH AND DISEASE. declare that , We take the responsibility of the content and material of our paper as We ourself have written it and also have read the manuscript of our paper carefully. Also, We hereby give our consent to publish our paper in Anvikshiki journal , This research paper is our original work and no part of it or it's similar version is published or has been sent for publication anywhere else. We authorise the Editorial Board of the Journal to modify and edit the manuscript. We also give our consent to the Editor of Anvikshiki Journal to own the copyright of our research paper.

Abstract

Āyurveda is the oldest system of medicine which is still in practice due to the scientific foundation of its fundamental principles based on the laws of nature, propounded by our great ancient sages of Ayurveda with close contact and prolong keen observation of the same. The entire ancient Ayurvedic literature is broadly divided into two groups of treatise known as Brahatrayi and Laghutrayi. both comprises a set of three text in each. Brahatrayi includes Caraka Samhita(3rdcentuary B.C.), Sushruta Samhita(2nd centuary A.D.), Astanga Hridayam of Vagbhatt(6thcentuary A.D.) Laghutrayi which comprises as Mādhava Nidāna(7th century AD), Sārangadhara Samhitā (13th century AD) and Bhāvaprakāśa (16th century AD.) The concept of environment in Ayurveda is quite comprehensive and deeply related to health and disease, and the treatment also.

Today the modern is deeply concern with the effect of environment on health. The study of only human being as a single entity ignoring their relation with total environment is not possible. So there has been an increased understanding to the study of interdependency between two because the health hazard created by environmental impact causes more concern to the health. Ayurveda in this regard is quite rich and can serve the humanity in better way through its holistic approach along with cost effectiveness.

Key Words : Desha, Kala, Vayu, Jala, Anupa, Janagal, Shodhan, Sadachara, Yamadanshtra, Ritucharya, Shlipada

Introduction

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The concept of environment is as old as human civilization. The modern Indian scientists should be astonished and also feel proud of our ancestors for their knowledge and views about environment. Our great sages emphasized the importance of environment and its effect on human beings. Āyurveda is quit rich in literature and practice due to the scientific foundation of its fundamental principles based on the law of nature¹. The entire ancient Ayurvedic literature is broadly divided into two groups of treatise known as Brahattrayi and Laghutrayi. Both comprises a set of three books in each. Brahattrayi includes Caraka Samhita(3rdcentuary B.C.), Sushruta Samhita(2nd centuary A.D.), Astanga Hridayam (6thcentuary A.D.). Laghutrayi Mādhava Nidāna written by Mādhavakara in 7th century AD, Sārangadhara Samhitā written by Sarangadhar in 13th century AD and Bhāvaprakāśa Samhitā written by Bhāva Miśra in 16th century AD.² Although these treatises (Laghutrayi) are subject specific but all the Āyurvedic concepts and their applications are described along with addition of new ideas, practices and formulation in appropriate context. The subject matter related to environment is described in different references at different places¹. In present scenario term environment implies all the external factors-living and non-living, material, which surround the human being. It includes not only the water, air and soil that form our physical environment but also the psychosocial and economic conditions under which we live. For descriptive purpose, environment has been classified as :

- i. Physical Environment-water, air, soil, housing, wastes, radiation etc.
- ii. Biological Environment -plant and animal life including virus, bacteria etc.
- iii. Psychosocial Environment - Customs, habit, beliefs, morals, cultural values religion, education, lifestyles, community life, social and political organization³.

Applied aspect of environment in Laghutrayi

For descriptive point of view the Ayurvedic literature is also divided under the headings of Biophysical environment and Psycho social environment.

1. *Biophysical environment*- It includes air, Water, Soil and season etc. which has given due consideration in relation to health and disease of an individual.
2. *Psycho social environment*- It comprises the concept of Hitkar (beneficial)and Ahitkar(non beneficial) āyu, Sadvrit, Acāra Rasāyana, and Dhārniya vega(suppressible urges)etc

The Biophysical environment

Concept of Vāyu (Air) and its relation with health and disease: Vayu is one of the most important component of physical environment. It affects the healthy and diseased state of an individual. For example the Vāyu blowing from one direction is different from the Vāyu of another direction as well as through different article is different in its properties and produces effect accordingly. In Bhavprakash this phenomenon is explained very well. According to that the Vāyu (air) blowing from east is heavy, warm, unctuous, vitiates *pitta* and *asrka*, causes heart burn and increases *Vāta*. It is beneficial to those who are fatigued, having increased *kapha* and suffering from *śosha*. While the Vāyu blowing from south is sweet, mitigates the aggravated *pitta* and *rakta*, light cold in potency, good for the eyes and does not increase *Vāta*⁴. Vāyu (air) of the fan relieves burning sensation, perspiration, fainting and exhaustion, and that coming from fan of *tāla* leaves mitigates all the three *doshas*, while that from fan of *vapśa* (bamboo) is hot, aggravates *rakta* and *pitta*; air from *cāmara* (made up of hairs of a kind of goat), fan made from cloth, peacocks feather and *vetra* mitigates doshas, unctuous, pleasant to the mind and so extolled as ideal⁵

Causes and effect of polluted Vāyu : The air which is Polluted by various means or mixed with smoke is held responsible for causing various disorders. Kāsa (cough) may be exaggerated in the persons who exposed

to smoke as well as to dust particles, because they irritate the respiratory tract⁶. Exposure to dust, smoke, sunrays and winds may produce hikka (Hiccup) and śvāsa (dyspnoea) in the human beings as mentioned in Mādhava Nidāna⁷. According to Bhāvamīśra the *Kāsa*, *Hikkā* (hiccup) and *śvāsa* (dyspnoea) are the diseases, which are caused due to smoke, dust and polluted air⁸. Thus the air and its properties along with its effect on health and disease are described in Laghutrayi in detail in applied form.

Concept of Jala (Water) and its relation with health and disease : Acarya Bhavmisra has given a great importance to Jala and used the term *Jivana* (life) for the same. He stated that it is the essence of life, the entire world is made up of it, hence life without water is completely impossible at all⁹.

The synonyms of water, its types, its properties, its necessity, and effect of impure water on health along with methods of its purification are depicted there in detail.

Kinds of Water

According to Bhāvmīśra, water is of two kinds- 1) Divya and 2) Bhauma¹⁰.

Divya is again of four types :

- (a) Dhāraja (rain water in torrents),
- (b) Karakābhava (water by melting of hail stones),
- (c) Taushāra (water from moist vapour) and
- (d) Hema (water from snowfall). Among these dhāraja is best in properties¹⁷.

Bhauma jala is subdivided into three types on the basis of Desha :

- a) Jāngala (from desert like lands)
- b) Ānupa (from marshy lands)
- c) Sādhāraṇa (from temperate / moderate lands)

Ācārya Bhāvmīśra also described the properties of various types of water and their effect on human beings at the state of health and disease¹¹.

Properties of pure portable water : Good drinking water is that which has no smell, no perceptible taste, cold, relieves thirst quickly, easily digestible and pleasing to the mind also¹².

Properties of Duṣṭa Jala (impure water) : Water that is slimy, having worms in it, unctuous, bad taste, and smell, contaminated specially with lotus leaves, algae, slough, with various colors etc. It is not good in touch, not touched by rays of sun and moon. The water of unseasonal rains should not be used for any purpose¹³.

Disease due to (Duṣṭa Jala) impure water: The diseases like Pipasa(thirst), Adhman(distention of abdomen), Jwara(fevers), Swasa(cough), Aruchi(dyspepsia), kandu (itching), pustule, enlarged lymph glands etc are caused due to polluted water¹⁴.

Methods of Purification of water: Contaminated or impure water should be purified either by boiling or by exposing to sun rays or immersing heated balls of gold, silver, iron stone or even sand. Minute worms etc. can be removed from water by filtering it through clean and thick cloth. It is then kept in clean vessels made by gold etc. Sweet smelling leaves, roots, lotus tuber, pearls, gold and *gomedaka* are put in to the water to make it clear. The pleasant smell can be made by putting *karpūra*(campher), flower of *jātī*(*jusmin*), *punnāga*, *pātālā* etc. to it. The water purified by such methods should be used¹⁵.

Jala Grahaṇakāla (time for collection of water): All types of water of the earth should be collected during morning itself, because it is cold and pure at that time¹⁶.

Thus water which is an important component of environment is as essential as air for life and to maintain health along with valuable therapeutic importance.

Concept of Deśa and its relation with health and disease : This is very important to understand the relation between Place or habitat with health and disease of an individual. In Sārangadhar Samhitā, it is mentioned that a particular type of drug should be collected from a particular *deśa*¹⁷ (place). *Like hot potency herbs from Vindhya mountain and cold potency from Himalyas.*

Specification of Deśa (place) for collection of herbs : The herbs grown in Vindhya Mountains are hot in potency and those available in Himālaya are cold¹⁸. Thus if one needs cold potency drug, he should get it from Himālaya, and if a hot potency drug is needed, it should be procured from the Vindhya. This also implies that a hot potency drug procured from Vindhya will be more powerful than that which is collected from Himalayas and vice versa. The potency of the herbs available in forests and other gardens etc. has to be identified on the basis of prevailing ecological conditions of that place¹⁹.

Drug should be collected from a *sādhāraṇa deśa* (place having qualities of both *Jāṅgala* and *ānūpa*) which is situated in the north direction²⁰.

Endemicity of ślīpada (filariasis) : In Mādhava Nidāna it is stated that the ślīpada occurs specially in those places, where there is always a collection of stagnating water and dampness round the year. These types of places are termed as *ānūpa deśa* and the peoples residing in these places are more prone for Slipada (filariasis)²¹. It is an important environmental phenomenon having deep relationship with health and diseased status of a person residing over there.

Concept of kāla (Time) and its relation with health and disease : Kāla is also an important environmental factor and its various aspects related to have been described in Bhāvaprakāśa and Sārangadhara Samhitā. The year is divided into six ṛtu (season) according to the movement of the sun in different *rāśis*²². The six ṛtu, which are mentioned in Bhāvaprakāśa are grīṣma, prāvṛt, varṣā, śarat, hemanta and vasanta. By other acharyas, śīśira, vasanta, grīṣma, varṣā, śarat and hemanta are mentioned respectively by the combination of two māsa commencing with māgha in their succeeding order²³. In regions, south of Gangā, rain being more prāvṛt and varṣā has been mentioned separately by Ayurveda scholars. In north regions snowfall is more therefore the hemanta and śīśira ṛtu have been mentioned separately²⁴.

Relation between Ritu and Dosha: In Ayurveda the concept of health and disease is govern by three doshas (Vata, Pitta, and Kapha) so their status according to Ṛtu (season) in the form of Sanchaya (accumulation), Prakopa (aggravation) and Prashamana (pacification) has great significance from health and disease point of view. According to Bhāvaprakāśa, vāyu undergoes at the state of caya (accumulation), prakopa (aggrevaion) and sama (pacification) in three season commencing with grīṣma respectively; similarly pitta in the three seasons commencing with varṣā and kapha in the three seasons commencing with śīśira²⁵.

	Grīṣma	Varṣā	Śarat	Hemanta	Śīśira	Vasanta
Vāta	Caya	Prakopa	Sama			
Pitta		Caya	Prakopa	Sama		
Kapha	Sama				Caya	Prakopa

Ṛtucaryā (Seasonal regimen): A specific diet and life style is prescribed by the scholars Ayurveda to maintain health and prevent disease. Bhavaprakash also mentioned that if a person, follows the regimen prescribed for each ṛtu (season) does not suffer from disease arising from effect of seasonal variation. For example the seasonal regimen of *Vasanta* (spring) which mitigate Kapha, the use of meat of animals of desert like region, wheat, rice, green gram, barley, *ṣaṣṭika*, anointing with body paste of *Candana* and *Aguru*, foods which are dry pungent, hot, light. Sweet and sour, curds, fats, day sleep, foods which are hard to digest and exposure to mist should be avoided by the wise person in the spring season²⁶. Preventive measures as therapies like *Vamana* (emesis), nasal medication licking powder of *Abhayā* with honey, exercise, massaging

and mouth gargles etc are advised. So by obeying the *ṛtucharya* one can remain disease free especially from seasonal diseases.

Collection of herbs according to Kāla (time): Herbs and drugs are the primary requirement for the management of a disease. The drug will produce effect according to its inherent properties. So the best period for collection of herbs for all types of therapies is śarat ṛtu as the herb endowed with best qualities at this time. For preparation of vamana and virecana (purgation) medicines, the herbs should be collected at the end of vasanta ^atu (spring)²⁷.

Drug administration according to Kāla (time): Principally every drug has its own time for its administration. So the time is a very important factor for drug administration. The drugs are to be administered early in the morning, particularly the kasaya group (svarasa, kalka etc.) Sārangadhara mentioned the five different kāla (times) in which various type of drugs are administered. These five times are-During sunrise, day meal, evening meal, repeatedly and at night²⁸.

Samśodhana Kāla (time of purification therapy): There are specific time and seasons prescribed for purification therapy in different disease. So the efficient physician should advocate indicated purification therapy like vamana (emesis), virecana (purgation) etc. to the individuals during śarat, vasanta (spring) and prāṇṛt²⁹. These therapies are administered for preventive as well as curative purpose. So the time and the season depends upon the indication and contraindication. For example the swedan (sudation) therapy should not be given to a pitta (prakṛiti puruṣa) constitution person in Grishma ritu and so on.

Concept of Yamadaṁṣṭrā Kāla (time of special precaution): According to Sārangadher Samhitā this is very important concept for prevention point of view. The last eight days of kṛtika and first eight day of āgrayana or mārgaśīrṣa, a period of total sixteen days, is known as Yamadaṁṣṭrā Kāla (teeth of yamaraj/ god of death). Only those can live happily in this period, who eat less food during this time³⁰.

Other components of physical environment produce their impact on health up to a great extent, such as sunlight, shade, rain etc. Ātapa (sunlight) leads of perspiration, fainting, bleeding disorders, thirst, exhaustion, fatigue, burning sensation and discoloration, whereas chhāyā (shade) protects from all these.

Vṛṣṭi (rain) is lassitude while kuheli (mist, fog) causes fear, delusion and increase of *kapha* and *vāta*³¹

Agni (heat) mitigates *vāta* and *kapha*, relieves stiffness, cold and shivering, mitigates *āma*, aggravates *rakta* and *pitta*. Dhūma (smoke) aggravates *kapha* immediately, very harmful to the eyes, causes feeling of the heaviness of the head and aggravates *vāta* and *pitta*. Thus all these factors should be avoided to prevent their harmful effect on health.

The psycho social environment

Concept of Sadācāra (code of conduct)

It is well established fact that the behavior of a person influences the social environment. Bhāva Mīśra has propounded many code of good conduct to make the social environment healthy as :

Friendship always developed with good persons, accompany with wise men and bad friendship should be avoided. One should help even to those who have done bad for him/her; consider all persons like himself, keep away from foes, should not consider any one as his foe nor himself as an enemy of others. One should not reveal his own disgrace nor his disrespect to his master. Always speak little, at the proper time, good, truth and sweet for conversation³².

One should behave with others in such a manner that would be pleasing considering their desires, liking and disliking. One should not enjoy pleasure alone, neither believe everybody nor suspect every one³³. Other code of conduct like, While participating in an assembly, coughing, laughing, yawning and sneezing should be done covering the mouth, should not blow out the nose with a sound, dust from the broom should never touch to the body of others.

So in this manner, one should spend his day time with righteous conduct always and then indulge in activities of the night as advised by the Āyurvedic scholars. Any person, who adopts right conduct in all activities, attains long healthy

life, affection, righteousness, wealth and glory. So in this way they have given equal importance to the social environment from health and disease point of view.

Discussion

Total health of an individual cannot be conceived without proper and suitable environment and surroundings of the person concerned. The study of only human being as single entity is not possible due to deep relationship between man and his different kinds of environment. Different component of environment as *vāyu*, *jala*, *deśa*, *kāla* etc. mentioned in the review reflect their importance for the maintenance of health, cure of disease and even the prognosis also.

Vayu (air) which is also considered as Prana (life) and even the god is given great importance from health point of view. Its pollution and prevention as well as purification by natural way is described in detail in all classics of Ayurveda. Presently it needs to be practiced in day to day life.

The contaminated or impure water should be purified either by boiling or by exposing to sun rays or immersing heated balls of gold, silver, iron stone or even sand; pleasant smell can be made by putting *karpūra*, flower of *jātī*, *punnāga*, *pātalā* etc. to it. Minute worms etc. can be removed from water by filtering it through clean and thick cloth. It is then kept in clean vessels made by gold etc. Sweet smelling leaves, roots, lotus tuber, pearls, gold and *gomedaka* are put in to the water to make it clear. Water purified by such methods should be used.

In word's of Hārīta, Tr̥ṣṇā (thirst) is dreadful and takes away life immediately, therefore persons suffering from thirst should be given water to save his life. Thirst causes loss of consciousness, which in turn causes loss of life, so water should not be withheld in any stage

Yamadaṃṣṭrā, which is the peak time of the aggravation of pitta doṣa and poor *jatharāgni* (digestive power) get disturbed leading to improper digestion, resulting in to causation of many diseases which may result fatal. Hence it is advised to consume less quantity of food during this period so as to avoid strain on the digestive system. According to Ayurveda indigestion is the root cause for various disease. So according to Sārāṅgadhara Samhitā the concept of *Yamadaṃṣṭrā* is very important from prevention point of view mainly from jathragni point of view.

Natural variation in the doshika rhythm is an indicator for maintenance of health and prevention of diseases. The three stages of each *Dosha* takes place during the phase when the sun changes from one Rashi (stellar constellation) to the other. These constellations are manifested in the form of a cycle of six seasons. Hence the Dosic rhythm vary accordingly. For example the Sanchaya (accumulation) of *vāta* takes place in *grīṣma* (summer) and Prakopa (aggravation) in *prāṇvṛt* (Pre rainy). *Pitta* accumulates in *varṣā* (rainy) and aggravates in *śarat* (early winter). *kapha* accumulates in *hemanta* and aggravates in *vasanta* (spring). Principally the *vāta* gets pacified in *śarat*, *pitta* in *vasanta* and *kapha* in *prāṇvṛt* naturally. If it does happens so not, then disease may occur according to the respective dosas. The accumulation, aggravation and pacification of doṣas are affected by *āhāra* (food) and *vihāra* (life style) also, irrespective of time and season. If *āhāra* and *vihāra* are similar to a particular *doṣa*, it is increased and when they are opposite, get decreased.

In Mādhava Nidānaa about fourteen hundred years ago people residing in Anup (marshy area) are considered as more prone for the *ślīpada* (filariasis). It is stated that this disease occurs in those places, where there is always a collection of stagnating water and dampness round the year. In modern science Filaria is also considered as tropical disease which also has been mentioned in Kāśyapa Samhitā. The puerperal management has been described according to the place of living. This is a specific contribution of Kāśyapa Samhitā in the field of prasuti tantra and stri roga for eg. in *jāṅgala deśa* (dry area), the disease of *vāta* and *pitta doṣa* are more prone, thus, here due to the congeniality of oleaginous substances. The use of such substances is strongly recommended, specifically for the woman having just delivered. The treatment of *amlapitta* according to

deśa also a unique contribution of Kāsyapa Samhitā. In human beings, this disease (*amlapitta*) often develops in marshy place that is why it should be treated with the medicine growing in *jāngala deśa* (arid zone). If it does not get pacified with this, the person should go to other place, because a particular *deśa* (region) is known as good where people live with disease free state. Vagbhata has mentioned that drug should belong to the same place as the patient to get good result of treatment. Thus the diet, life style, disease and their management differ accordingly in respective areas.

The other components of physical environment which affect the life of human being are *ātapa* (sunlight), *vr̥ṣṭi* (rain) and *Agni* (fire) etc. *Ātapa* leads to perspiration, fainting, bleeding disorders, thirst, exhaustion, fatigue, burning sensation and discoloration, whereas *chāyā* (shade) protects from all these. *vr̥ṣṭi* (rain) is lassitude while *kuheli* (mist, fog) causes fear, delusion and increase of *kapha* and *vāta*.

As for as the Psychosocial environment is concern one should behave in such a way that should be caring of others in all respect. The code of good conduct which should be followed while dealing with the social affairs is described, endowed with morals and ethics. In Charak Samhita the Sadvritta, Achar Rasayana and practice of dharma (righteous act) is described in detail to maintain the social harmony. There Adharma (unrighteous act) considered as basic cause for the epidemic. So everyone should behave according to the way prescribed to maintain the harmony in the environment. It seems today that Adharma/ Unethical practices are the root cause of pollution of every kind of environment either physical or psychosocial.

Hence if a person adopts right conduct in all activities, attains long healthy prosperous life. This results in the creation and maintenance of healthy social environment which produces positive impact on all kinds of health which is beneficial for him and the society vice-versa.

Conclusion

After going through the whole literature of Laghutrayi it seems that not only the ancient scholars like Charaka, Sushruta and Vagbhata etc, but also the scholars of medieval period and modern age are quite nearer to the nature for the maintenance of health and cure of disease. Their vision to live in harmony with environment is not only in physical perspective but it is far wider and much comprehensive as psychosocial and spiritual also. They were definitely well aware about their surroundings with keen minute observation in relation to maintain the health and a disease free condition. In the present era, if these principles are practiced and applied in various aspect of life, may be helpful for the society and the humanity not only at personal, social, regional and national level but also throughout the globe without any cost.

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COMPARATIVE STUDY OF RAJAYAKSHMA AND PULMONARY TUBERCULOSIS

ANISH KUMAR*

Declaration

The Declaration of the author for publication of Research Paper in The Indian Journal of Research Anvikshiki ISSN 0973-9777 Bi-monthly International Journal of all Research: I, *Anish Kumar* the author of the research paper entitled COMPARATIVE STUDY OF RAJAYAKSHMA AND PULMONARY TUBERCULOSIS declare that, I take the responsibility of the content and material of my paper as I myself have written it and also have read the manuscript of my paper carefully. Also, I hereby give my consent to publish my paper in Anvikshiki journal, This research paper is my original work and no part of it or its similar version is published or has been sent for publication anywhere else. I authorise the Editorial Board of the Journal to modify and edit the manuscript. I also give my consent to the Editor of Anvikshiki Journal to own the copyright of my research paper.

Abstract

Tuberculosis is the most infectious disease spread all over the world especially in underdeveloped and developing countries as details about the etiological aspects have already mentioned in modern review. The approach has been given if there is any correlation between pulmonary tuberculosis and Rajayakshma whatever mentioned in Ayurveda. There are quite similarities between pulmonary tuberculosis and rajayakshma. Etiology, pathogenesis, symptoms of both the diseases are quite similar. That is why the comparative study of both the disease is so important before going to treatment.

Key Words: Rajayakshma, Tuberculosis.

Introduction

Ayurveda - "science of life and longevity" is considered as the traditional system of medicine of India. It is the oldest health care system on the earth. It is holistic & qualitative science of health and longevity, which include person as a whole, body and mind¹. The aim of this system is to prevent illness, heal the sick and preserve life². To cure the disease, diagnosis and differential diagnosis of that particular disease is so important³. Comparative study is also the important part of the treatment. Pulmonary Tuberculosis and Rajayakshma are also quite similar. Tuberculosis is caused due to mycobacterium tuberculosis infection which is responsible for chronic type of inflammatory process suffers within its disease process and complication. Rajayakshma as mentioned in Ayurveda is a disease which is caused due to over consumption and by the micro-organisms.

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Etiological comparison

Most of the Ayurvedic authors have described the four main causes of the Rajayakshma⁴. Acharya Sushruta has counted this disease in the aupsargic diseases (Nidana Sthana)⁵. So the infection can also be considered the etiology of Rajayakshma and this is the Sannikrashta cause of the Rajayakshma. Modern science also describes that M. tuberculosis does not produce the disease in all the persons, but produces primary tuberculosis. So they described some provoking factors which may be responsible for the disease. Along with this Charaka also stated aetiological factors which cause the four types of Yakshma like bharawahan, adhwagaman, plawan, vyayam etc. these produce Rajayakshma due to overexertion. Likewise he described different causes of 4 typed Yakshma. Modern science has also described the provoking factors like cigarette smoking, alcoholism, immune-suppressive agent and some diseases like leukaemia, lymphoma etc. So both the sciences have described the aetiological factors of Rajayakshma which have some similarities in them.

*Comparison of Pathogenesis**Rajayakshma*

There are two type of nidana in pathogenesis of Rajayakshma: 1) Sannikrishta nidana which is the upasarga and this may be the infection of M.tuberculosis, 2) Viprakrishta nidana is 4 typed sahasjanya, sandharanajanya, kashayajanya and vishamashanajanya. Sandharana and vishamashana janya Rajayakshma follows the common pathogenesis⁶. A person who gets vegavrodha and vishamashan, his doshas (specially predominance of kapha), vitiate and block the channels of circulation. This leads to dhatukshaya in progressive manner and ultimately the emaciation developed. While kshaya and sahasa janya work vitiate the vata and this vitiated vata leads to dhatu kshaya in reverse manner, ultimately emaciation develop. In both condition when patient gets emaciated, if the upasarga is superimposed this can lead to Rajayakshma.

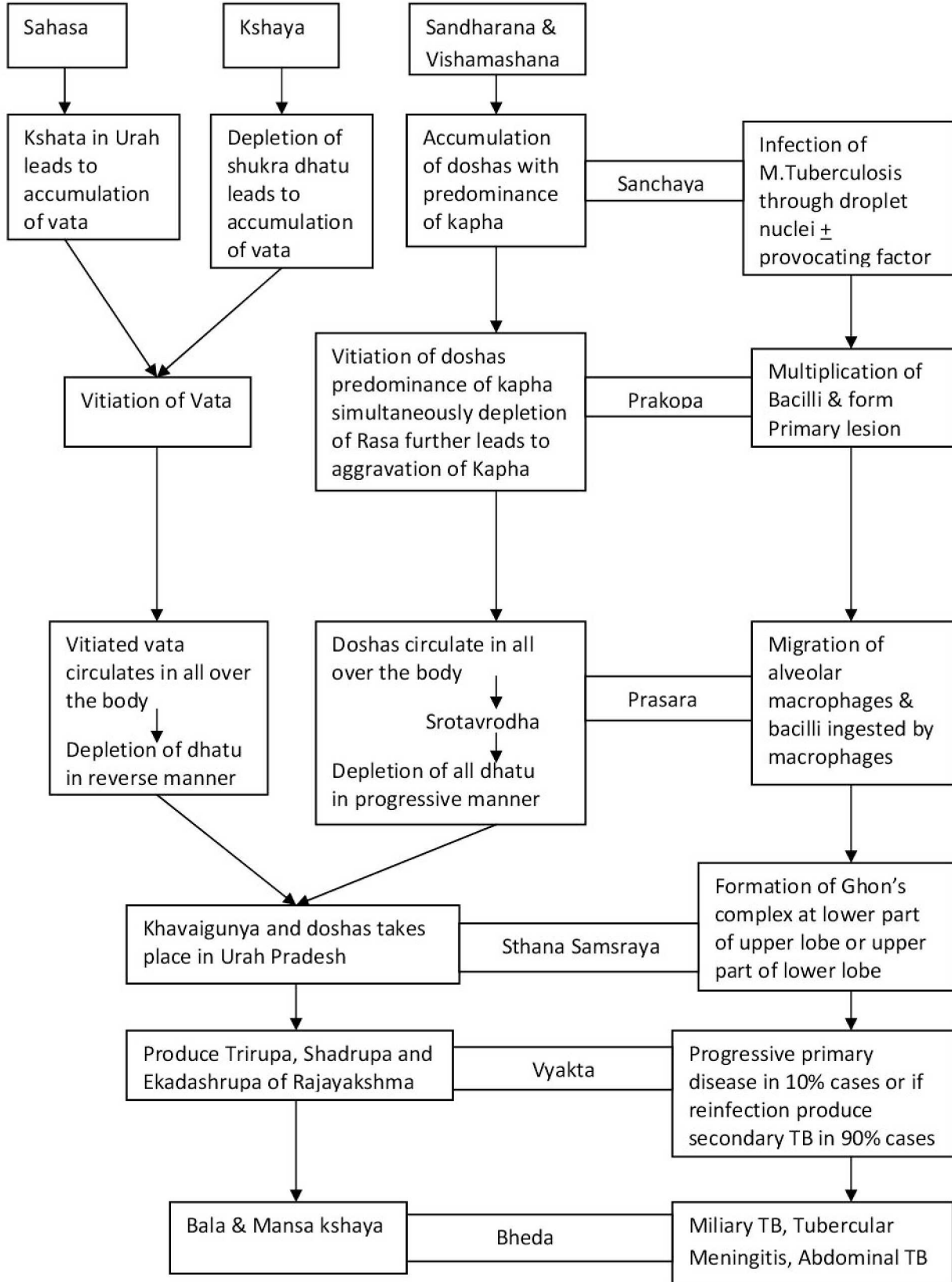
Pulmonary Tuberculosis

The initial entry of tubercle bacilli into the lung in previously unaffected individual diets a non-specific acute inflammatory response when is rarely noted and is usually accompanied by few or no symptoms. Bacilli are then ingested by the macrophages and transported to the regional lymph nodes. If spread of the organism is not contained at the level of regional lymph node, then tubercle bacilli reach the blood stream and widespread dissemination ensues. Most lesion of disseminated tuberculosis bear, as do most primary lesion although they remain potential foci of later reactivation. Dissemination may result in miliary or meningeal tuberculosis especially in infants and young children⁷.

Conclusion

On the basis of above description of both the diseases we can conclude that Tuberculosis is caused due to mycobacterium tuberculosis infection which is responsible for chronic type of inflammatory process suffers within its disease process and complication. Rajayakshma as mentioned in Ayurveda is a disease which is caused due to over consumption and by the micro-organisms. In this disease patient gradually becomes emaciated and develop different types of symptoms which have been divided in three categories as trirupa, shadrupa and ekadashrupa. Most of the symptoms mentioned in Ayurveda have also been mentioned in modern science. So aetio-pathological and symptomatological similarities strongly support that these two diseases are not separate.

Aetio-pathogenesis of Rajayakshma and pulmonary tuberculosis:-



Comparison of symptoms of Rajayakshma and pulmonary tuberculosis:-**Rajayakshma****Pulmonary Tuberculosis**

Trirupa	
According to Charaka⁸	According to Bhoja
Ansa-parshwabhitapa	Kasa
Santapa karpadayo	Jwara
Jwara	Raktashthiwana

Features of Early TB
Cough
Fever
Haemoptysis

Shadrupa	
According to Charaka⁹	According to Sushruta¹⁰
Kasa	Kasa
Jwara	Jwara
Parshwashoola	Swarabheda
Swarabheda	Aruchi
Atisara	Shwasa
Aruchi	Shonita darshan

Cardinal Features of TB
Cough
Evening rise fever
Anorexia
Weight loss
Tiredness
Haemoptysis

Ekadashrupa		
According to Sushruta¹¹		
Due to Vata	Due to Pitta	Due to Kapha
Swarabheda	Jwara	Shirsa
Ansa-parshwashoola	Daha	paripurnatwam
Ansa-parshwaSankocha	Atisara	Abhakt chhanda
	Rakta-agama	Kasa
		Kanthodhvasa

Progressive Features of TB
Evening rise fever
Night sweats
Lassitude
Weight loss
Anorexia
Severe cough
Excessive sputum
Haemoptysis
Pleuric chest pain
Dyspnoea
Headache

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INFLUENCE OF DIETARY NUTRIENTS ON PROPER WOUND HEALING

DR. NEERU NATHANI*

Declaration

The Declaration of the author for publication of Research Paper in The Indian Journal of Research Anvikshiki ISSN 0973-9777 Bi-monthly International Journal of all Research: I, *Neeru Nathani* the author of the research paper entitled INFLUENCE OF DIETARY NUTRIENTS ON PROPER WOUND HEALING declare that , I take the responsibility of the content and material of my paper as I myself have written it and also have read the manuscript of my paper carefully. Also, I hereby give my consent to publish my paper in Anvikshiki journal , This research paper is my original work and no part of it or it's similar version is published or has been sent for publication anywhere else. I authorise the Editorial Board of the Journal to modify and edit the manuscript. I also give my consent to the Editor of Anvikshiki Journal to own the copyright of my research paper.

Abstract

Wound healing is a natural body response to injury, with restoration of normal structure and function of tissues. Some wounds heal earlier, some later and a few heal with difficulty. In the process of healing there is increased metabolic demand of nutrients. Different dietary nutrients have specific impact on different phases of normal wound healing, to improve healing time and wound outcome. Hypoproteinaemia, anaemia, deficiency of vitamins and minerals are some important causes of delayed wound healing. In Ayurveda it is said that if a patient does not take wholesome diet it is difficult to recover by the only use of medicines, as the medicines become less effective without wholesome diet. For a wounded person specific dietary articles are prescribed by acharya Sushruta, like Shali Rice, Green Gram, Indian Gooseberry, Pomegranate, Bathua etc. Use of them and other substances having similar properties prove much effective to improve digestive power and strength of the wounded for better wound healing. An injured person should avoid excessive eating, fasting, irregular food habits, incompatible diets, eating again before the digestion of previous meal etc. Various researches have also proved that nutrition of patient is of unchallenged importance in wound healing. Our aim is to explore and advice wholesome dietary articles to the wounded, for promotion of wound healing in shortest time, with minimal pain, discomfort and scarring.

Key words: Congenial diet, Dietary nutrients, Nutritional deficiencies, Wound healing

Introduction

Trauma to the body tissues by any means either due to accidental injury or surgical intervention results in wound formation. Process of healing is a natural body response to injury to restore normal structure and

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function of tissues. It involves the activity of blood cells, tissue types, cytokines and growth factors with increased metabolic demand of nutrients. Some wounds heal earlier, some later and a few either heal with difficulty or do not heal. Most chronic wounds are associated with ischemia, diabetes mellitus etc. and result in enormous health care expenditures. Although various local and systemic factors influence the repair, the overall health and nutritional status of wounded influences significantly the healing process. Haemostasis, Inflammation, Proliferation and Remodeling are the four integrated phases of normal wound healing. Adequate calories, dietary proteins, vitamins and minerals are absolutely essential for proper wound healing, having specific impact on different phases of healing. Nutritional deficiencies can impede wound healing time and wound outcome.

Impact of nutrients on different phases of Wound Healing

The dynamic process of wound healing consists of four continuous and integrated phases - Haemostasis, Inflammation, Proliferation and Remodeling. Ayurveda proclaims that vrana passes through four stages before actual healing viz. Dushta, Shuddha, Ruhyamana and finally the Ruhya Vranavastu. Energy, carbohydrate, protein, fat, vitamin, and mineral metabolism all can affect the healing process (*Arnold and Barbul, 2006*).

Hemostasis begins immediately after wounding, with vascular constriction and fibrin clot formation. The clot and surrounding wound tissue release pro-inflammatory cytokines and growth factors. The inflammatory phase is characterized by the sequential infiltration of neutrophils, macrophages, and lymphocytes (*Gosain and DiPietro, 2004; Broughton et al., 2006; Campos et al., 2008*). Vitamin A enhances early inflammatory phase and vitamin C enhances neutrophil migration and lymphocyte transformation. Adequate protein intake prevents prolonging of inflammatory phase.

The proliferative phase generally follows and overlaps with the inflammatory phase, and is characterized by granulation tissue formation, epithelial proliferation and migration over the provisional matrix within the wound i.e. re-epithelialization. During this phase vitamin C is necessary for collagen synthesis and vitamin A promotes epithelial cell differentiation. Zinc is required for DNA synthesis, cell division and protein synthesis, and Glucosamine enhances hyaluronic acid production.

Following collagen and extracellular matrix synthesis the remodeling phase occurs, which may last for years. In this phase, regression of many newly formed capillaries occurs, so the vascular density of wound returns to normal. Protein deficiency inhibits wound remodeling.

Nutrients essential to Wound Healing

Carbohydrates: Primary source of Energy for angiogenesis and deposition of new tissues (*Shepherd, 2003*).

The use of glucose as a source for ATP synthesis is essential in preventing the depletion of other amino acid and protein substrates (*Arnold and Barbul, 2006*). Shali rice and Barley are rich sources of carbohydrates, light in nature and easy to digest.

Fatty Acids: Lipids are used as nutritional support for surgical or critically ill patients to meet energy demands and provide essential building blocks for wound healing and tissue repair. Omega-3 fatty acids have been reported to affect pro-inflammatory cytokine production, cell metabolism, gene expression, and angiogenesis in wound sites (*McDaniel et al., 2008; Shingel et al., 2008*).

Proteins: Collagen is the major protein component of connective tissue, mainly composed of glycine, proline, and hydroxyproline. A deficiency of protein can impair capillary formation, fibroblast proliferation, proteoglycan synthesis, collagen synthesis, and wound remodeling (*Guo et al., 2010*). Arginine improves immune function, and stimulates wound healing in healthy and ill individuals (*Tong and Barbul, 2006*). Glutamine is the most abundant amino acid in plasma and is a major source of metabolic energy for rapidly

proliferating cells such as fibroblasts, lymphocytes, epithelial cells, and macrophages. Glutamine has a crucial role in stimulating the inflammatory immune response occurring early in wound healing (*Arnold and Barbul, 2006*). Antibodies against infection are protein in nature. Pulses are the rich source of proteins and Green gram is best among them. Minimum required daily dose of dietary protein is 0.8 gm per kg body weight.

Vitamin C: Ascorbic acid is an important cofactor for the synthesis of collagen, proteoglycans and organic components of the intracellular matrix of bones, skin, capillary walls, and other connective tissues. It is a tissue anti-oxidant, essential for hydroxylation of proline and lysine. Indian gooseberry (Amla) is the richest source of vitamin C. Daily 1-2 gm Ascorbic acid is recommended until healing is complete (*Levenson et al., 1992*).

Vitamin A: It is responsible for anti-oxidant activity, increased fibroblast proliferation, modulation of cellular differentiation and proliferation, increased collagen and hyaluronate synthesis, and decreased extracellular matrix degradation (*Burgess, 2008*). Vitamin A is essential for epithelialization, and protects the body from microbes. Short-term supplementation of 25,000 IU daily before and after elective surgery is recommended (*Levenson et al., 1992*).

Vitamin E: It is an anti-oxidant, maintains and stabilizes lysosomes and cell membrane integrity, has anti-inflammatory properties, decreases excess scar formation in chronic wounds.

Vitamin K: It helps in clotting mechanism, cofactor for synthesis of coagulant factor II, VII, IX and X.

Vitamin D: It mediates gut absorption of calcium, essential for bone formation.

Zinc: Many enzymes are zinc dependent, like Metalloenzymes, DNA and RNA polymerases. Zinc supplementation of 15-30 mg daily is recommended from wound onset until complete healing.

Iron: It is the constituent of haemoglobin, myoglobin and cytochromes, removes hypochromic anaemia. Iron is required for hydroxylation of proline and lysine. Green vegetables like Bathua, Chaulai etc are rich sources of Iron and other minerals.

Copper: It is a co-factor for cytochrome oxidase, and cytosolic anti-oxidant superoxide dismutase. Copper is required for the optimal cross-linking of collagen and haemoglobin synthesis.

Magnesium: It is an important co-factor for many enzymes involved in protein and collagen synthesis.

Deficiency of these vitamins and minerals causes a significant impairment in wound healing. Fresh fruits and vegetables are the rich sources of them.

Food Articles indicated for a Wounded

According to acharya Sushruta, Vrana (wound) is a state of tissue destruction and after healing it leaves a scar persists throughout life of individual. A vrana may be Nija or Agantuja. Nija vrana is the wound produced by systemic effect of vitiated doshas in the body. Specific food items are prescribed for a wounded, like Shali Rice, Barley, Green Gram, Rock Salt, Indian Gooseberry, Pomegranate, Bathua, Chaulai, Parval, Pointed Gourd, Bitter Gourd, Brinjal etc (*Sushruta Sutra Sthana 19/32-34*). These foods are rich in carbohydrate, protein, vitamins and minerals essential for wound healing. They balance the tridosha, improve digestive power and strength of the wounded for better wound healing. Madhura rasa predominant food is nourishing, vitalizing, and produce lusture and strength. Tikta rasa predominant foods are appetizer, antitoxic and germicidal, alleviate burning and itching, and help in absorption of pus. Kashaya rasa predominant food promotes healing and union. Regular intake of them and other substances having similar properties should be in proper quantity, considering the digestive capacity of the person, the season and similar other factors.

Contraindicated Food Items

Along with the intake of useful dietary items the avoidance of contraindicated food is very much essential. Acharya Sushruta also given a list of harmful food to be avoided by wounded as they hamper the proper digestion. Due to indigestion, vata and other doshas get vitiated severely and cause inflammation, pain, discharge, burning sensation and suppuration of wound. New Cereals, Black Gram, Tila, Dry Pea, Kulattha, Cold water, Kheera, Curd, Milk, Amla, Lavana, Katu & Guru Ahara, incompatible food has been contraindicated (*Sushruta Sutra Sthana 19/16-18*). Apart from that some food habits like Excessive eating, Fasting, Irregular intake, Eating again before the digestion of previous meal are also prohibited.

Conclusion

Nutritional status of the wounded person influences the biochemical processes of normal wound healing. Adequate dietary proteins, carbohydrates, vitamins and minerals play significant role in wound healing, and their deficiencies would delay wound healing with greater risk of complications. The food items indicated for a wounded contain all important nutrients required for proper wound healing. To promote healing in shortest time, with minimal pain and discomfort to the patient, it is essential to advice congenial dietary articles, in adequate quantity, to the wounded.

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ORGANIC AGRI-BIOTECH: SUCCESS ENGINE FOR GREEN GROWTH, LIVELIHOOD SECURITY & SUSTAINABILITY

RAJESH KUMAR DUBEY*

Declaration

The Declaration of the author for publication of Research Paper in The Indian Journal of Research Anvikshiki ISSN 0973-9777 Bi-monthly International Journal of all Research: I, *Rajesh Kumar Dubey* the author of the research paper entitled ORGANIC AGRI-BIOTECH: SUCCESS ENGINE FOR GREEN GROWTH, LIVELIHOOD SECURITY & SUSTAINABILITY declare that, I take the responsibility of the content and material of my paper as I myself have written it and also have read the manuscript of my paper carefully. Also, I hereby give my consent to publish my paper in Anvikshiki journal, This research paper is my original work and no part of it or its similar version is published or has been sent for publication anywhere else. I authorise the Editorial Board of the Journal to modify and edit the manuscript. I also give my consent to the Editor of Anvikshiki Journal to own the copyright of my research paper.

Abstract

Organic farming system in India is the most modern as well as most ancient method of farming and livelihood security. It is a method of farming system which primarily aimed at cultivating the land and raising crops in such a way, as to keep the soil alive and in good health by use of organic wastes (crop, animal and farm wastes, aquatic wastes) and other biological materials along with beneficial microbes (bio-fertilizers) to release nutrients to crops for increased sustainable production in an eco-friendly pollution free environment. Organic farming avoids use of synthetic inputs, and relies upon crop rotations, crop residues, animal manures, off-farm organic waste, mineral grade rock additives and biological system of nutrient mobilization and plant protection. Organic agriculture is a unique production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles and soil biological activity, and this is accomplished by using on-farm agronomic, biological and mechanical methods in exclusion of all synthetic off-farm inputs.

Key Words: Organic Agriculture, Sustainable Development, Crop Rotations, Crop Residues, Animal Manures.

Introduction

Organic agriculture a holistic production and management system which is supportive to environment, health and sustainability. As per the definition of the United States Department of Agriculture (USDA) study team on organic farming “organic farming is a system which avoids or largely excludes the use of synthetic inputs (such as fertilizers, pesticides, hormones, feed additives etc) and to the maximum extent feasible rely upon crop rotations, crop residues, animal manures, off-farm organic waste, mineral grade rock additives and biological

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system of nutrient mobilization and plant protection”.FAO suggested that “Organic agriculture is a unique production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles and soil biological activity, and this is accomplished by using on-farm agronomic, biological and mechanical methods in exclusion of all synthetic off-farm inputs”.

Of the world’s 1.09 billion extremely poor people, about 74 % or 810 million live in marginal areas and rely on small-scale agriculture for their livelihood. India is mainly an agricultural country, where agriculture contributes to about 14.6 percent in gross domestic product (GDP) and support over 58 percent of nation’s population for livelihood (GOI, 2010).Promoting the organic agriculture is of paramount importance to protect biodiversity and cultural diversity of India. In most developing countries, agriculture continues to be the most important sector of the economy, accounting for the biggest proportion of employment (Båge, 2005).Seventy two percent (72%) of India’s population lives in in more than 550,000 *villages*villages and is dependent on agriculture based economy (www.indianchild.com). Agricultural co-operatives in India are the backbone of the cooperative system and involved in variety of function and serving the rural masses by providing credit, fertilizers, seeds, agro-Chemicals, agriculture implements and marketing etc. Co-operatives are the best mechanism to address credit, market and supply chain in organic agricultural commodities (Artz& Newman, 1990).

Organic agriculture is mostly popular & practiced by small & marginal farmers so it makes cooperative a double success. The formation of cooperatives has to be with the full involvement of members (Putnam, Markovchick et al, 1996). Organic farms although yield on an average 10-15% less than conventional farms, the lower yields are balanced by lower input costs and higher margins. Its annual growth rate has been about 20% for the last decade (Lotter, 2003), accounting for over 31 million hectares of area and generating over 26 billion US dollars in annual trade worldwide (Escobar and Hue, 2007). Organic agriculture is now being practiced in more than 130 countries with a total area of 30.4 million hectare, about 0.65% of total agricultural land of the world (Willer et al., 2008). With respect to the area under organic agriculture, Australia occupies the prime position followed by China, Argentina, USA, Italy and many other countries (Willer et al., 2008). India, although comes at second place with respect to total number of certified organic farms (44,926), occupies 13 position as far as the area under organic agriculture concerns. In India, about 528,171 hectare area is under organic agriculture (including certified and area under organic conversion) accounting for about 0.3% of total agricultural land.

Origin of Agriculture Cooperation

Agriculture co-operation has been in practiced since the Babylonian civilization. However its present form owes its origin to the industrial revolution in Britain in the 19th century (Johnson & Johnson, 1975). Cooperative movement in India started way back in 1905. Till 1939, Agricultural Cooperatives in India were distributing only the credit to the farmers, but is now diversified for production, marketing, distribution etc. The co-operatives were formed to take advantages of economies of scale against exploitation by middlemen and traders and share the benefits “equitably” among the members. Consequently, cooperatives are always found to be engaged in economic activities promoting increase in income and thereby enhancing living standards. All agriculture cooperatives are formed around a common “commodity” or “group of similar commodities” e.g. thrift cooperatives around savings and credit (Asia & Africa), dairy co-operatives around milk (India), oilseeds co-operatives around oilseeds (India), coffee growers cooperatives around coffee (Ethiopia) etc. The principle of formation and management of cooperatives, as the term itself refers, is the promotion of cooperation among members for common good, equitable ownership of the enterprise thus formed and profit distribution in share of the patronage by members (Johnson & Johnson et al, 1984).

The Need for Formation of Agricultural Co-operatives

Analysis of cooperative formation points out two major reasons for the formation of agricultural co-operatives:

1. Solve market failures and,
2. To address distortions in the supply chain.

Market failures have mainly been in the form of exploitation of individual farmers or producers largely by market intermediaries resulting in remunerative prices not reaching the individual producers. Distortions in supply chain are mainly through market intermediaries who get into a win-win situation for themselves both from the supply of raw material or agricultural inputs to the disposal of the produce. Global studies on agricultural produce markets have revealed that supply chain inefficiencies contribute to as much as 30-50% loss of revenue to the producer. Thus individual producers—typically small and medium farmers who do not have a great deal of negotiation powers due to:

1. Quantum and value of the assets they have,
2. Carrying capacity—both financial and infrastructural,
3. Volume of operations;
4. Lack of market information and
5. Lack of access to formal financing mechanism in absence of collaterals.

This relationship also prevents the individual farmers in seeking alternative market mechanisms because loans against no collaterals also means advance mortgaging their produce to the market intermediaries who discount procurement prices and sale at market prices making high profits.

Benefits of Organizing into Cooperatives; The co-operatives are formed around a commodity or group of similar commodities, it enables the members to pool their resources and thus take advantages of economy of scale (Slavin, R. 1996). The economy of scale provides benefits at all level of supply chain starting from the procurement of raw material or agricultural inputs to economical warehousing facilities; to leveraging of transportation costs, processing and finally marketing eliminating intermediaries. The other benefits are social in nature as experiences have shown that the cooperative model allow for employment of local youth. Cooperative promotes social cohesion, gradation of societal infrastructure, creation of employment opportunities, updated market information, quality consciousness, education on power of collective action, common goods etc. Cooperatives also enable their members to leverage finance at softer interest rates and attract international development agencies to even provide grants for societal infrastructure up gradation and investment in other livelihood opportunities.

Cooperatives Role in Organic Agricultural Credit Disbursement; Cooperatives play a very important role in disbursement of organic agricultural credit. Credit is needed both by the distribution channel as well as by the farmers. The distribution channel needs it to finance the input & fertilizer business and farmers need it for meeting various needs for agricultural production including purchasing fertilizers (Metzke&Berghoff, 1999). The credit needed by the farmers for purchase of fertilizers and other inputs is called 'short term' credit or 'production credit' whereas credit needed by the distribution channel is called 'Distribution Credit'. Cooperatives also play a very important role in disbursement of 'Medium Term' and 'Long Term' credit needed by the farmers' for purchasing agricultural equipments viz tractors, installation of tube wells and land development works etc. India is the seventh-largest country by geographical area, the second-most populous country with over 1.2 billion people, and the most populous democracy in the world. The Indian organic agriculture sector is the fastest growing sector in the world. Following market-based economic reforms in 1991, India has become one of the fastest growing major economies, and is considered a newly industrialized country; however, it continues to face the challenges of poverty, illiteracy, corruption and inadequate public health. Thus the poor and not so well educated have been the worst sufferers whether in villages or in the cities can be incentivizing for the organic farming & organic trading. In India, 78 per cent of the farmers belong to the category of small and marginal farmers. They depend heavily on credit for their agricultural operations. These farmers will not be able to adopt the modern organic agricultural practices unless they are supported by a system which ensures adequate and timely availability of credit on reasonable terms and conditions. National Bank for Agriculture and Rural Development (NABARD) was established in the year 1982 works for progressive institutionalization of the rural credit and ensures that the demands for credit from agriculture including the new and upcoming areas like floriculture, tissue culture, bio-fertilisers, sprinkler irrigation, drip irrigation etc. are met. The public guarantee system (PGS) of organic certifications & production to processing & marketing of organic produce is finding enormous boost from the cooperative & groups.

Analysis of Success Factors

The analysis of factors enabling the cooperatives for their success point to two major reasons.

1. Interventions and investment along the supply chain
2. Investment in the societal infrastructure.

Supply Chain Interventions

1. Agricultural commodities by their very nature are dependent on supply chain efficiency. Thus interventions were made along the supply chain. Success has been dependent on the identification of the priority intervention at the level of the supply chain which makes the significant difference followed by other intervention to make best use of limited resources.
2. The second factor for success has been the tie up of the supply chain functions to leverage cooperative advantage e.g. micro finance, finance, raw material procurement, production and processing technology, quality awareness, and market linkages.
3. Thirdly, the success achieved was in building the capacity of members on farming practices and relevant organic agricultural practices which not only boosted yields but also created better crop management & husbandry practices.

Societal Investments: All the investments made by cooperatives are undertaken after taking into consideration societal mores and practices especially the ones that help strengthen the societal fabric Stevens & Slavin 1995. Consequently, the creation of organic farmers schools, processing centers and organic nurseries, organic seed banks employment opportunities contribute to the wealth generation in different forms for the society at large.

Organic Farming: Crop Production and Plant Protection; Organic farming methods enable farmers save money by increasing crop production, value-added products for health & environment. An organic farmer avoids poisoning of land, water; air, enriches soil and supports consumption and sale of safe food. Organic cultivation adds balanced nutrients and micro-nutrients to the land. The soil will become enriched and micro-nutrient deficiency is eliminated. Betterment in water conservation, balance of microbial profile & eco-line of insect- pest population get strengthen in the organic system.

Conclusions

Organic agriculture is healthy, safe and ecologically sound. Organic farming is the only recourse for farmers, to save both livelihood and the health of the soil. Organic farming methods enable farmers save money. It is possible to turn one's own farmyard waste into value-added products for increasing crop production. However, scientific knowledge alone is not sufficient. Practical experience, accumulated wisdom and traditional and indigenous knowledge offer valid solutions, tested by time. Organic agriculture should prevent significant risks by adopting appropriate technologies and rejecting unpredictable ones, such as genetic engineering. Decisions should reflect the values and needs of all who might be affected, through transparent and participatory processes. Organic Agriculture should be managed in a precautionary and responsible manner to protect the health and well-being of current and future generations and the environment. Organic agriculture is a living and dynamic system that responds to internal and external demands and conditions. Practitioners of organic agriculture can enhance efficiency and increase productivity, but this should not be at the risk of jeopardizing health and well-being. Consequently, new technologies need to be assessed and existing methods reviewed. Given the incomplete understanding of ecosystems and agriculture, care must be taken. The conclusion notes that although CSA is not for every producer or consumer, it offers a sustainable opportunity for organic growers with strong communication and community building skills to employ a special niche market. For Mahatma Gandhi, a free India meant the existence of thousands of self-sufficient small communities who rule themselves without hindering others. Presently this has remained a utopia. The lopsided development process needs to be corrected by taking the education to the village poor and giving them access to the latest in technology, so as to enable them and empower them. Organic agriculture & rural development

implies both the economic betterment of people as well as greater social transformation. In order to provide the rural people with better prospects for economic development, increased participation of people in the rural development programmes, decentralization of planning, better enforcement of agriculture & land reforms and greater access to credit are envisaged by the Government of India under its various schemes for rural development. The cooperative development has been associated with the best mechanism to address market and supply chain failures in organic agricultural commodities. The only caveat being that the formation of cooperatives has to be with the full involvement of members. Additionally, relevant tie ups and use of business principles to run and manage cooperatives professionally are important factors of success. Their role has been commendable and helped in making essential inputs availability to the rural masses. These need to be further strengthened.

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EFFECT OF SILVER NANOPARTICLES ON ANTIOXIDANT STATUS OF *BRASSICA JUNCEA* CALLUS

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Declaration

The Declaration of the authors for publication of Research Paper in The Indian Journal of Research Anvikshiki ISSN 0973-9777 Bi-monthly International Journal of all Research: We, Priyadarshini Sharma, Sanjay Gupta and Sandeep Arora the authors of the research paper entitled EFFECT OF SILVER NANOPARTICLES ON ANTIOXIDANT STATUS OF *BRASSICA JUNCEA* CALLUS declare that , We take the responsibility of the content and material of our paper as We ourself have written it and also have read the manuscript of our paper carefully. Also, We hereby give our consent to publish our paper in Anvikshiki journal , This research paper is our original work and no part of it or it's similar version is published or has been sent for publication anywhere else. We authorise the Editorial Board of the Journal to modify and edit the manuscript. We also give our consent to the Editor of Anvikshiki Journal to own the copyright of our research paper.

Abstract

Present study underlines the effect of silver nanoparticles (at 0, 25, 50, 75, and 100 ppm) on the growth and level of antioxidant status of 40-day-old Brassica juncea callus. Fresh weight of callus is positively affected by silver nanoparticle treatment upto 50ppm. It induced a 22 % increase in callus weight. Levels of malondialdehyde and hydrogen peroxide decreased in the treated callus. Nanoparticle treatment induced the activities of specific antioxidant enzymes, resulting in reduced reactive oxygen species levels. Decrease in proline content confirmed the improvement in antioxidant status of the treated callus. The observed stimulatory affects of silver nanoparticles are found to be dose dependent, with 25-50 ppm treatment being optimum for eliciting growth response.

Key Word : Silver nanoparticles (SNP), *Brassica juncea*, Callus growth, Malondialdehyde, Hydrogen peroxide

Introduction

Mustard is an important oil seed crop in India being next to groundnut. Mustard seed has got 35-40% protein content with higher nutritive value. Achieving the increased demand of mustard seed production, in the limited area available for cultivation, is a major challenge. Therefore, there is an urgent need to bring under cultivation hitherto underutilized or unused marginal lands that are affected by various factors. So there is need of smart agriculture. One alternate strategy to tackle the problem could be the use of specific nano materials for promotion of plant growth and productivity.

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Nanotechnologies have become a significant priority worldwide. Several manufactured nanoparticles are increasingly used in consumer products. At nanosize range, the properties of materials differ substantially from bulk materials of the same composition, mostly due to the increased specific surface area and reactivity, which may lead to increased bioavailability and toxicity. The emergence of nanotechnology and the development of new nano devices and nano materials have opened up new frontiers for the potential novel applications of nanoparticles in agriculture and biotechnology¹⁻². Attempts are made to increase the yield potential of various crops by using nanoparticles as enhancers of various growth factors contributing higher yield to overcome land shrinkage and costly inputs³. Silver nanoparticles have become a significant tool in the development of novel biological and chemical processes. The successful use of silver nanoparticles (SNP) in diverse medical streams as antifungal and antibacterial agents has led to their applications in controlling phytopathogens⁴⁻⁵.

Studies on the seed germination and root growth of zucchini plants in hydroponic solution amended with SNP showed no negative effects whereas a decrease in plant biomass and transpiration was observed on prolonging their growth in presence of SNP⁶. Silver nanoparticles are among the most potential candidates for modulating the redox status of plants, because of their ability to support electron exchange with Fe^{2+} and Co^{3+} , the two elements that participate in several biological redox reactions⁷. Silver nanoparticle clusters show efficient catalytic activity in redox reactions by acting as electron relay centers, behaving alternatively as an acceptor and donor of electrons⁸. Application of SNP showed maximum inhibition for the growth of fungal hyphae and conidial germination in in vivo tests⁹. On contrast, a raise in the concentration of nano silver from 20 ppm to 60 ppm has led to an improvement in the seed yield in case of Borage¹⁰. Application of silver thiosulfate (STS) in potato culture medium increased chlorophyll content comparing to the control plants significantly. With STS, ascorbate peroxidase and guaiacol peroxidase activities in roots were higher than shoots, while catalase activity was higher in leaves than roots. However, increasing of STS concentration in the culture medium resulted in higher activities of antioxidant enzymes¹¹. Therefore, the present work attempts to elucidate the effect of silver nanoparticles on *Brassica juncea* callus growth and antioxidative status under specified conditions.

Material and Methods

Material: Seeds of *Brassica juncea* (cv. pusa jaikisan) were obtained from Indian Agricultural Research Institute, New Delhi.

Preparation of Silver Nanoparticles: Silver nanoparticles were synthesized through chemical reduction of silver nitrate by trisodium citrate salt, as described by Sileikaite et al.¹². The synthesized silver nanoparticles were characterized by transmission electron microscopy and UV–vis spectroscopy.

Plant Material and Treatment: The seeds were germinated in Murashige and Skoog medium¹³ and allowed to grow for six days. Callus of *Brassica juncea* (Var Pusa Jaikisan) were developed from hypocotyls explants, obtained from 6-day old seedlings using 1 ppm NAA and 1 ppm BAP. 20 days old calli were subsequently cultured on MS media supplemented with 0 ppm, 25 ppm, 50 ppm, 75 ppm and 100 ppm concentration of silver nanoparticle for 20 days and were sub cultured on the same medium, for next 20 days. Culture conditions provided are, 26 ± 1 °C temperature and relative humidity of 70 %, illumination 40-W florescent tubes having a photon flux density of approximately 16 Wm^{-2} with a 16/8 h day/night cycle. After 40 days of treatment, different physiological & biochemical parameters were recorded in order to deduce the optimum concentration of silver nanoparticles.

Callus growth: The fresh weight of callus was recorded at the time of inoculation by directly weighing them on electronic balance, after taking out the callus mass from. This was considering as initial weight of callus. Final weight of callus was recorded after 40 days of inoculation. Per Cent growth was calculated as:

$$\frac{\text{Final wt of callus} - \text{initail wt of callus}}{\text{initail wt of callus}} \times 100$$

Elemental analysis: After treatment callus samples were digested with tri acid mixture and concentration of Silver nanoparticles in the callus tissues was measured by atomic absorption spectrophotometer¹⁴.

Free proline content: Leaf tissue extract homogenized in 3% sulfosalicylic acid was mixed with equal quantities of glacial acetic acid and acid ninhydrin reagent and incubated for 1 hour at 100°C. The reaction was terminated in an ice bath, followed by extraction of the colored chromophore in toluene. The absorbance of the chromophore was measured at 520nm. Concentration of proline in the samples was computed from a standard curve of L-proline¹⁵.

Malondialdehyde content: Leaf material was homogenized and extracted in 0.25% TBA (w/v) prepared in 10% TCA. The homogenate was heated at 95°C for 30 minutes and centrifuged at 10,000xg for 30 minutes. Absorbance of the supernatant was recorded at 532nm and 600nm. Absorbance at 600nm was subtracted from the absorbance at 532nm for non-specific absorbance. The concentration of MDA was calculated by using an Extinction Coefficient of 155mM⁻¹cm⁻¹.

Hydrogen peroxide content: Leaf material was homogenized in 0.1% (w/v) aqueous trichloroacetic acid (TCA) and centrifuged at 10,000xg for 30 minutes at 4°C. 1ml of supernatant, 1ml of 0.1M potassium phosphate buffer and 4ml of 1M KI reagent were mixed. The reaction was allowed to develop for 1 hour in dark and the absorbance was measured at 390nm. The amount of H₂O₂ was calculated using standard curve of H₂O₂¹⁷.

Ascorbate Peroxidase: Ascorbate peroxidase activity was determined as described by Joshi et al.¹⁸ with minor modifications. Fresh leaf material was homogenized in 100mM phosphate buffer (pH 7.0) and 0.1mM EDTA and centrifuged at 12,000×g for 30min at 4°C. For enzyme assay, 60μl of supernatant was mixed with 1,438μl of assay buffer [50mM phosphate buffer (pH 6.0), 0.1μM EDTA, 0.5mM ascorbate] and 2 μl of 0.5M H₂O₂ was added to start the reaction. The decrease in absorbance was recorded and enzyme activity was calculated by using extinction coefficient 2.8mM⁻¹ cm⁻¹ at 290nm. Specific enzyme activity was expressed as enzyme units per milligram of protein.

Guaiacol Peroxidase: Guaiacol peroxidase (GPX) activity was determined as described by Joshi et al.¹⁸. Leaf material was homogenized in 3.0ml of 100mM phosphate buffer (pH 7) containing 0.1mM EDTA and centrifuged at 12,000×g for 30min at 4°C. Two millilitre reaction mixtures were prepared by adding 60μl of enzyme extract to 1,790μl of assay buffer [100mM phosphate buffer (pH 7), 0.1μM EDTA, 5.0mM Guaiacol, 15.0mM H₂O₂]; guaiacol was added in the last to start the reaction. Increase in absorbance was recorded at 470nm and enzyme activity was quantified using a molar extinction coefficient of 26.6mM⁻¹ cm⁻¹. The enzyme specific activity was expressed as enzyme units per milligram protein.

Catalase: Catalase activity was measured according to Joshi et al.¹⁸. Leaf material was homogenized in 100 mM phosphate buffer (pH 7) containing 0.1mM EDTA and centrifuged at 12,000×g for 30min at 4°C. 70μl of enzyme extract was added to 1,370μl of assay buffer (100mM phosphate buffer pH 7.0, 0.1μM EDTA) and 60 μl of 0.5M H₂O₂ was added to start the reaction. Decrease in absorbance was recorded at 240nm and enzyme activity was calculated by using the H₂O₂ molar extinction coefficient of 36 mM⁻¹ cm⁻¹ and the enzyme specific activity was expressed as enzyme units per milligram protein.

Statistical analysis: All experiments were carried out three times, with two replicates each. One way ANOVA was carried out to determine significant differences (P < 0.05) between the means. The experimental data are expressed as mean ± SE.

Result and Discussion

Characterization of Silver nanoparticles: Silver nano particles were synthesized through chemical reduction of Silver nitrate by tri-sodium citrate salt. The synthesized silver nano-particles were characterized by UV-Visible spectrophotometer¹⁹. Formation of Silver nano-particles was ascertained by mapping the absorption spectra of the synthesized particles from 200 to 750nm. The absorption maximum (λ_{max}) was recorded at 425nm (Fig. 1a). The size of Silver nano-particles was deduced by transmission electron microscopy. Silver nano-particles were first sonicated to disperse the aggregated form, if any. Silver nano-particles have shown a size range of 5-20nm (Fig. 1b).

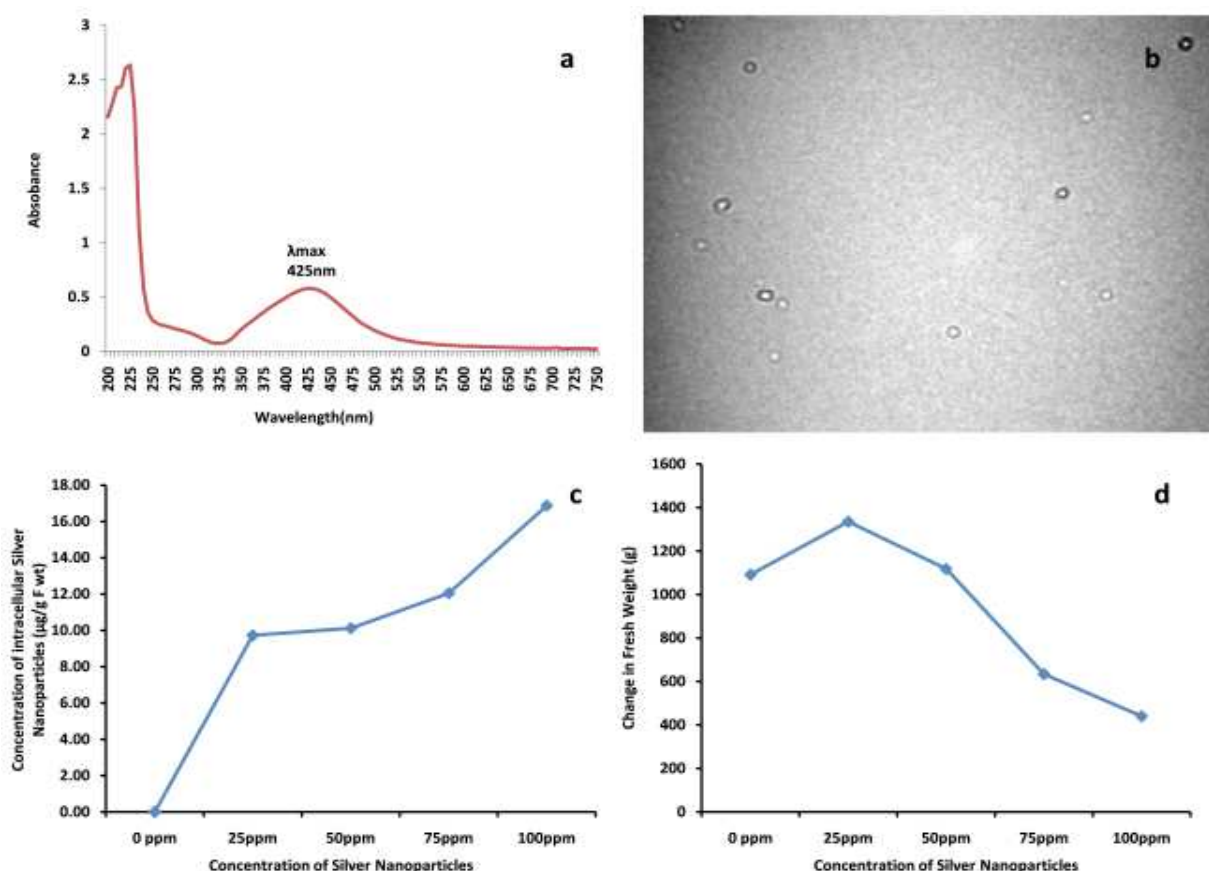


Fig 1 *Characterization of SNP* (a) UV VIS Spectrum (b) Morphology (c) Concentration of SNP in callus tissue using Atomic Absorption Spectrophotometer. (d). Change in fresh weight of *B.juncea* callus.

Uptake of SNP and callus growth: Uptake of silver nanoparticles by the calli increased with increasing concentration of nanoparticles in the growth media (Fig. 1c). The uptake of SNP by *B. juncea* has also been shown earlier²⁰. The fresh weight of callus increased with SNP treatment. A maximum increase of 22% was recorded at 25 ppm SNP (Fig. 1d). However, at higher concentration SNP showed detrimental effect. Gardea-Torresdey et al.²¹⁻²² found that Au(III) and Ag(I) ions in agar solid growth media got reduced and accumulated as gold and silver nanoparticles inside alfalfa seedlings. *Brassica juncea* showed silver uptake was largely independent of exposure time and concentration²³. Nanoparticles by themselves do not confer specific binding to biological targets, which is a prerequisite for their use in a biological context. Most of the metal nanoparticles taken up by plants include elements for which ion transporters

have been identified²⁴. Once inside the cells, nanoparticles may be transported apoplastically or symplastically. They may be transported from one cell to the other through plasmodesmata. However, the specific activity and effect of a particle does not only depend on the physiology of the target cell, but also on the physicochemical properties of the particle itself.

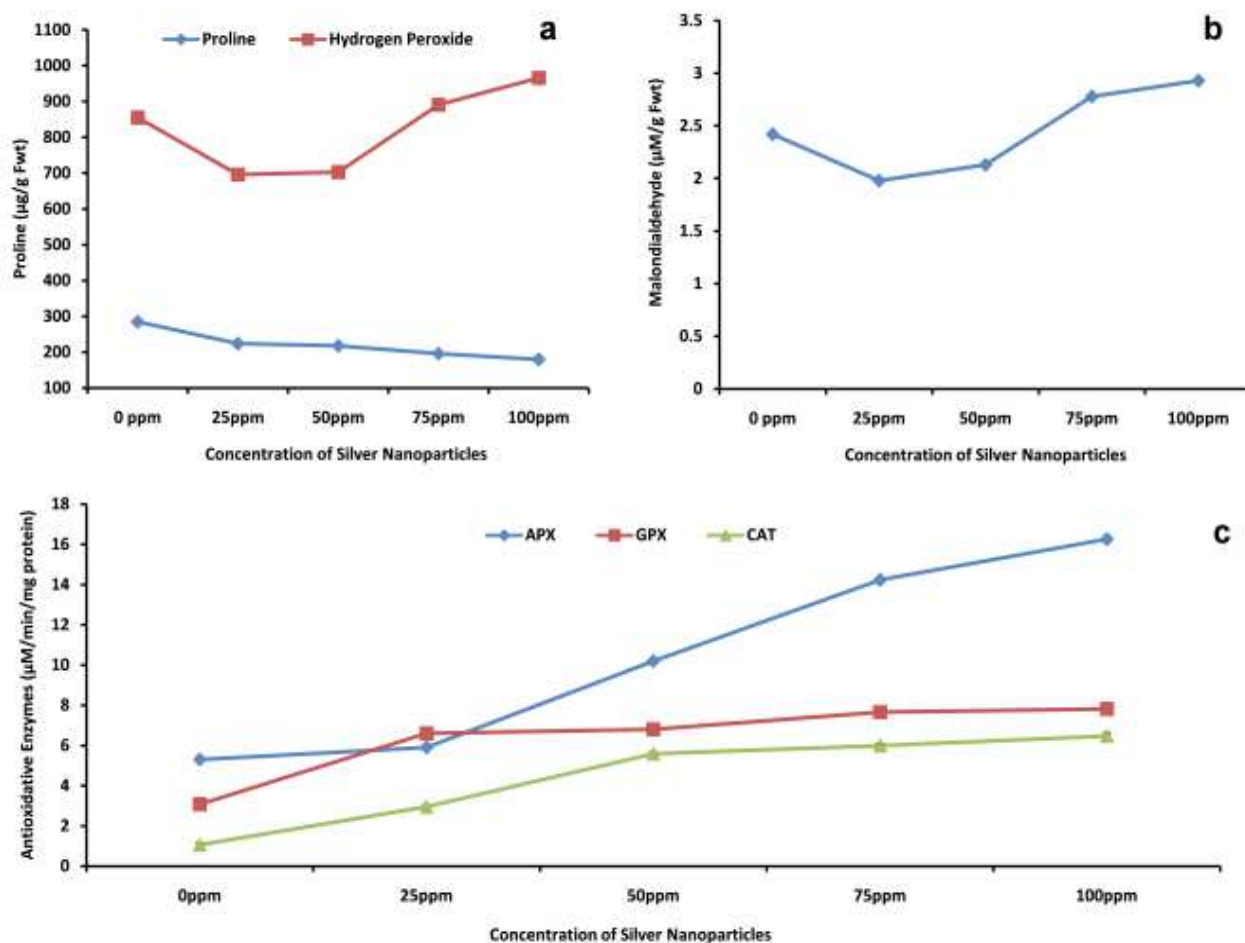


Fig 2 Effect of SNP on (a) Proline and Hydrogen peroxide content. (b) Malondialdehyde (c) Ascorbate peroxidase, Guaiacol peroxidase and Catalase activity in *Brassica juncea* callus grown in media supplemented without and with different concentrations of silver nanoparticles.

Effect of SNP on reactive oxygen species: Level of proline, hydrogen peroxide and malondialdehyde declined significantly as treated with SNP. Maximum reduction was at 25 and 50ppm SNP concentration. Proline concentration decreased steady with rise in SNP concentration and a maximum reduction of 36% was found at 100ppm (Fig. 2a). Maximum decline of 22.3 % in MDA and 18.5 % in H₂O₂ levels was recorded at 50 ppm silver nanoparticle treatment (Fig. 2b, 2a). Decrease in MDA, an index of ROS production, was significant at 25 and 50 ppm silver nanoparticle treatment, as compared to other concentrations (Fig. 2b). Further, the level of H₂O₂, one of the most damaging forms of reactive oxygen species, also decreased in the treated seedlings. Presence of SNP in the growth medium significantly controlled level of H₂O₂. Specific activity of ascorbate peroxidase and catalase increased continuously with increasing concentration of silver nanoparticles in the growth medium (Fig. 2c). When plants are exposed to stress off any kind reactive oxygen species (ROS) such as superoxide radical or hydroxyl radical, hydrogen peroxide is produced. The increased activity indicates towards increased production of secondary metabolite hydrogen peroxide,

which potency enhances the production of antioxidant enzyme. The induced oxidative stress was related to silver accumulation within *Brassica* callus, with the increasing concentration of SNP exposure in the medium. Thwala suggested that toxicity of SNP could be caused by both the particulates and ionic forms, as modified by media properties²⁵. Similarly, biotransformation and accumulation of Ag(I) ions into Ag in alfalfa and mustard seedlings were reported^{23,26}. Silver and gold nanoparticles demonstrated low to zero toxic effects on lettuce and cucumber, and effects could be primarily due to the presence of stabilizers. Various sizes of SNP were tested and result showed that silver colloid (0.6–2 nm) had greater toxicity in flax, barley and ryegrass than SNP of 5 and 20 nm²⁷. Effects of nanoparticles thus depend upon the plant species, types of NPs, concentration, size, aggregation, functionalization, and experimental conditions including temperature and time, and method of exposure (seeds/seedlings/cell suspensions)²⁷⁻²⁹.

Conclusion

The results demonstrate that presence of silver nanoparticle in the growth media can improve the growth of *B. juncea* callus by reducing reactive oxygen species and increasing antioxidant enzyme activity. More studies are required in this area to find out the mode of induction. It follows that optimized use of silver nanoparticles can modulate oxidative stress in plants.

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PREVALENCE OF IRON DEFICIENCY ANEMIA IN FEMALE MEDICAL STUDENTS

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Declaration

The Declaration of the authors for publication of Research Paper in The Indian Journal of Research Anvikshiki ISSN 0973-9777 Bi-monthly International Journal of all Research: We, *Sunita Tripathy, Vijay Kumar, Vikas Kumar and Ragini Srivastava* the authors of the research paper entitled PREVALENCE OF IRON DEFICIENCY ANEMIA IN FEMALE MEDICAL STUDENTS declare that , We take the responsibility of the content and material of our paper as We ourself have written it and also have read the manuscript of our paper carefully. Also, We hereby give our consent to publish our paper in Anvikshiki journal , This research paper is our original work and no part of it or it's similar version is published or has been sent for publication anywhere else. We authorise the Editorial Board of the Journal to modify and edit the manuscript. We also give our consent to the Editor of Anvikshiki Journal to own the copyright of our research paper.

Abstract

Introduction : Iron deficiency anemia (IDA) is widely prevalent especially amongst women in India. Female students at their adolescent phase are at an increased risk of developing anemia due to increasing iron demand. It results in negative effect on physical and mental development, decreased learning and work capacity and influences reproductive health. Therefore this study was undertaken in 100 female medical students of age group 17-25 years, to determine the prevalence of Iron deficiency anemia in apparently healthy looking girls.

Materials and Methods : Venous blood samples were collected for estimation of hemoglobin concentration (Hb%), Mean Corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), red blood cell count (RBC) and also for Iron Profile for determination of Serum iron (SI), Total Iron-Binding Capacity (TIBC) and Serum Ferritin (SF) and Transferrin Saturation (TS). As per WHO cut off value for hemoglobin <12 g%, subjects were labeled as anemic and non anemic. Prevalence of Iron Deficiency anemia and latent anemia was also determined by WHO criteria.

Result : The prevalence of Iron deficiency anemia was 21% with 6% of latent anemia in our study. All the students were belonging to either middle or high socioeconomic class.

Conclusion : Prevalence of 21% Iron deficiency anemia and 6% of latent anemia in apparently healthy medical girls suggest that awareness must be increased regarding diet, factors affecting absorption of iron and need for screening for anemia even in middle and high socioeconomic class.

Key Words : Iron deficiency anemia (IDA), Latent Anemia (LA), hemoglobin concentration (Hb%), Mean Corpuscular volume (MCV), Serum iron (SI), Total, Serum Ferritin (SF) and Transferrin Saturation (TS).

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Introduction

Anemia is a global public health problem affecting both developing and developed countries. In 2002, iron deficiency anemia (IDA) was considered to be the most important contributing factors to the global burden of anemia¹. Iron deficiency anemia is the most common micronutrient deficiency. A WHO study shows that in developing countries 52% of pregnant women and about 35% to 40% of non-pregnant women suffer from iron deficiency anemia². Iron deficiency anemia (IDA) is widely prevalent especially amongst women in India³.

Female students at their adolescent phase are at an increased risk of developing anemia due to increasing iron demand during puberty, menstrual losses, limited dietary iron intake and faulty dietary habits. The major consequences of anemia are increased risk of maternal and child mortality. It results in negative effect on physical and mental development, decreased learning and work capacity. At the same time influencing on reproductive health in adolescents and adults⁴.

There are many reports on prevalence of iron deficiency anemia in adolescent girls of rural and urban areas but there are very few studies reporting prevalence of anemia in healthy looking female medical students. So this study was undertaken on 100 healthy looking female medical students of age group 17-25 years to determine the prevalence of iron deficiency anemia among them.

Aim

To study the iron status in asymptomatic female medical students and to determine the prevalence of iron deficiency anemia in this group.

Materials and Method

100 asymptomatic girl students of age between 17-25 year of Narayan Medical College and Hospital were included in this study. Anthropometric measurements included weight (kg) and height (m) taken by standard techniques. The study was approved and funded by the Research Committee and Ethical Committee of our college. Fasting blood samples were drawn by venipuncture into two different vacutainers. 5 mL of blood was drawn into a vacutainer tube with EDTA for determination of hemoglobin (Hb), hematocrit (Ht), Mean Corpuscular Volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), red blood cell count (RBC). Blood (~5 mL) was drawn into a plain vacutainer tube for determination of Serum Iron (SI), Total Iron-Binding Capacity (TIBC) and Serum Ferritin (SF).

Subjects were given a written questionnaire for information like parent's educational status, annual income, any parasitic infection, menstrual history etc. Written consent was taken from each and every student.

Blood count and red cell indices were estimated on cell counter (SYSMAX-XS-800L of Transasia) and serum ferritin was assayed by Chemiluminescence method and SI and TIBC were estimated by biochemistry Auto Analyzer EM-200 of Erba.

Exclusion criteria

Girls suffering from any chronic illness e.g., asthma, rheumatic heart disease etc, or receiving any long term allopathic or indigenous drug treatment were excluded from the study. Similarly girls with history of any severe illness within the past 2 weeks for which they required hospitalization were also excluded.

The criterion for anemia was WHO cut-off value of Hb as 12gm% in females. For IDA Hb<12gm%, MCV <80 fl, Ferritin < 12ng/ml, TIBC > 400 µg /dl, S.I < 30 µg/dl and Transferrin Saturation (TS) < 16%, and that for Latent Anemia was Hb ≥ 12, MCV > 80fl, Transferrin Saturation < 16% and Ferritin <12ng/ml⁶.

Result

100 apparently healthy girl students of Narayan medical college participated in this study. Age of these students was ranging from 17 -25 yrs with mean age 20.7 years. Out of 100 students, 32% were in adolescent phase and rest 68% of these female students were adults. . Distribution of these students according to age is shown in the table no-1 and fig no.-1 given below.

T A B L E 1 *For distribution of age*

AGE	%
17-19	32
20-22	58
23-25	10

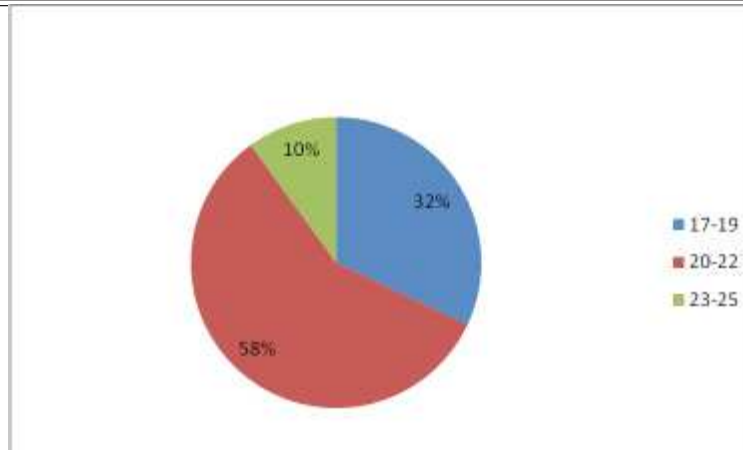


Fig 1 Pie chart showing age distribution.

Out of 100 female students according to WHO cut- off values 19 were anemic (Hb<12 g/dl) & 81 were non-anemic, as shown in table-2 and Fig no-2.

T A B L E 2 *Showing distribution of anemic and non anemic students*

Category	Total
Anemic	19
Non-Anemic	81
Total	100

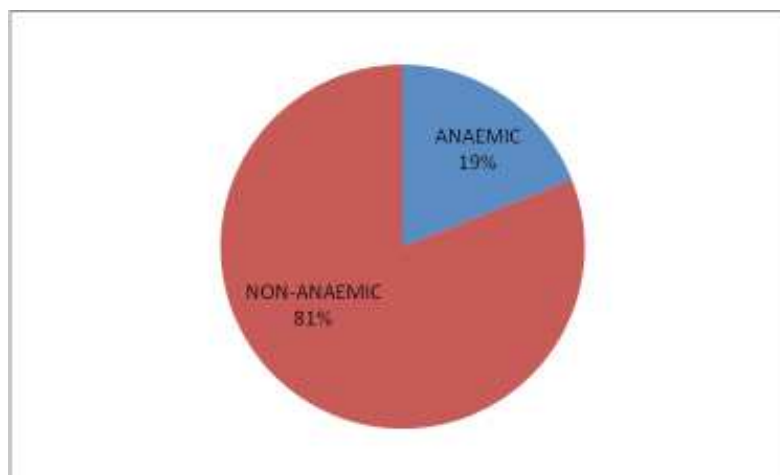


Fig 2 Pie chart showing percentage of anemic and non anemic students

On grading anemia as per WHO cut-off values of Hb, out of 19 anemic students, there were 15 (78.9 %) cases in mild category, 4 (21.1%) had moderate anemia and none had severe anemia .details given in table no -3 and fig no-3 by bar chart.

T A B L E 3 Showing severity of anemia

Degree of anemia	Number	Percentage
Mild (Hb 10- 11.9 g %)	15	78.9%
Moderate (Hb 8-9.9 g %)	4	21.1%
Severe (Hb <8 g %)	0	0
Total	19	100%

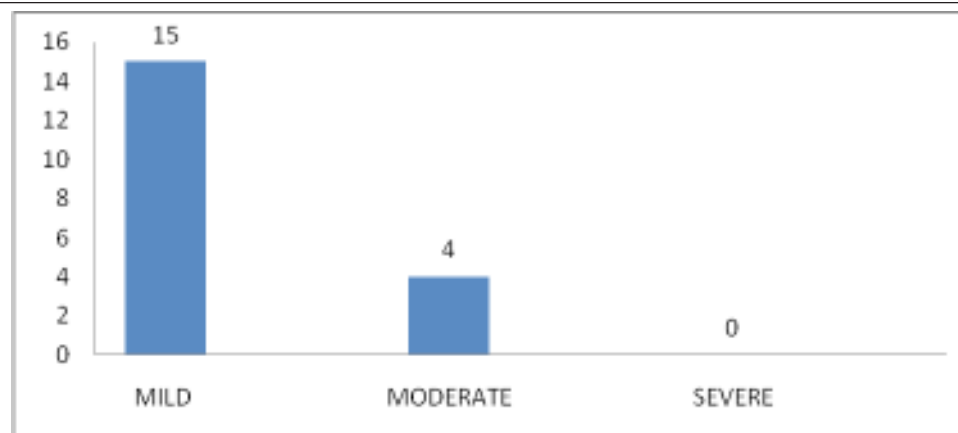


Fig 3 Bar chart showing severity of anemia

To assess iron status of these medical students we had estimated Serum Iron (SI), Total Iron Binding Capacity (TIBC), Transferrin Saturation (TS) and Serum Ferritin (SF) level.

Out of 100 students, 4(21.1%) were found to have Iron Deficiency Anemia. Mean and SD of above parameters of iron deficiency anemia students has been presented in the following table no.4.

T A B L E No 4 Showing parameters for iron status of IDA students

Parameter	IDA	
	Mean	S.D
Hb gm%	9.2	1.2
MCV(fl)	72.2	5.11
Serum Iron(μ g/dl)	45.0	12.37
Serum Ferritin(ng/ml)	7.9	1.62
TIBC(μ g/dl)	520	62.21

Statistical analysis of various parameters for iron status like Hb%, MCV, Serum Iron, Serum Ferritin, TIBC and Transferrin Saturation was done by SPSS. We found that the difference of all the parameters between anemic and non anemic students were statistically significant except MCV, which is shown in Table no.5 and fig no -5 by bar chart.

T A B L E 5 Parameters showing Iron status of anemic and non anemic students.

Parameters	Anemic		Non anemic		P value
	Mean	S.D	Mean	S.D	
Hb gm%	10.68	1.0	13.11	0.70	0.0000001
MCV(fl)	88.59	8.6	94.17	13.90	0.097
Serum Iron(μ g/dl)	80.37	32.93	123.67	34.76	0.000003
Serum Ferritin(ng/ml)	35.00	26.96	50	25.44	0.01
TIBC(μ g/dl)	325.11	76.44	291.59	36.49	0.005
Transferrin Saturation %	27.11	12.57	44.17	16.23	0.00003

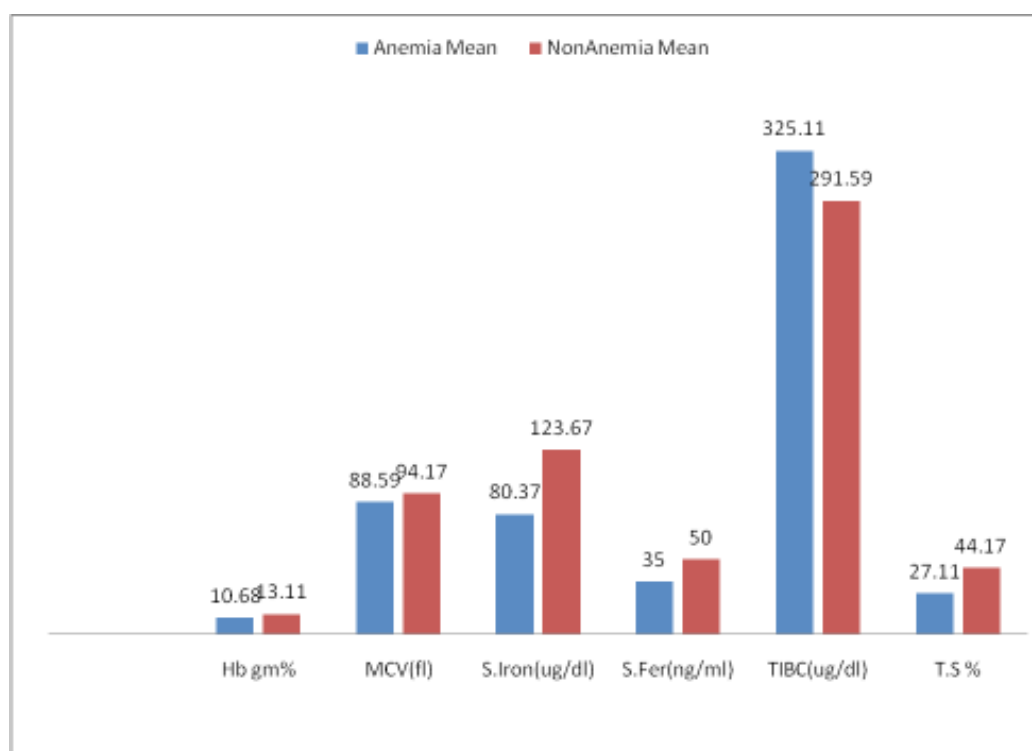


Fig 5 Bar chart showing Iron status of anemic and non anemic students.

Criteria for Latent anemia used were as follows- Hb value >12 g%, ferritin <12 ng/ml and transferrin saturation <16%. There were 5(6.01%) out of 81 non anemic girls students having latent anemia. We compared the iron profile data of IDA with that of latent anemia and results were highly significant for all except TIBC, as shown in table no -6

T A B L E 6 Comparative study of iron profile in IDA and Latent anemia group

Parameter	IDA		Latent Anemia		P value
	Mean	S.D	Mean	S.D	
Hb (g %)	9.2	1.2	12.58	0.3	0.0004
MCV(fl)	72.2	5.0	92.0	8.14	0.003
Serum Iron(μg/dl)	45.0	12.0	62.18	5.4	0.02
S.Ferritin(ng/ml)	7.9	1.62	10.5	1.1	0.023
TIBC(μg/dl)	520	62.0	445.0	8.0	0.065
Transferrin Saturation%	10.5	2.14	14.1	0.7	0.008

Discussion

Iron deficiency anemia is the most common form of malnutrition in the world and is the eighth leading cause of disease in girls and women in developing country⁷.

The most commonly used screening methods for the presence of iron deficiency in a population are the measurements of hemoglobin or hematocrit⁸.

According to WHO guidelines of cut off value of hemoglobin concentration (Hb <12 g %), the overall prevalence of anemia in our study was 19% and 81% students were non anemic. All of the students were either from middle or high socio economic status. Similarly a study by Sabita Basu reported that the prevalence was 23.9% in urban girls, who were from middle and high income group⁹. Sarita et al reported 22.90% prevalence

of anemia in medical students of Indore¹⁰. Over all prevalence of anemia was 35.1% in a study conducted by Sanjeev choudhry¹¹. Other studies reported much high prevalence of anemia in adolescent girls, but they were belonging to low socioeconomic group. Toteja GS et al showed the prevalence in adolescent girls as 90.1%¹². Kapoor & Aneja et al as 50.8%¹³ and National Family Health Survey -3 as 55%¹⁴. The prevalence of anemia is less in our study as compared to above studies as the cases belonged to urban & educated class. Anemia was detected among 24.62% in Dubai medical college¹⁵.

On grading anemia according to WHO cut value of hemoglobin, 15(79%) students had mild anemia and 4 (21%) students had moderate anemia in present study. There was no student with severe anemia. Similarly Choudhury et al reported no severe anemia in their study but there were 69.2% mild anemia and 30.8% had moderate degree of anemia¹¹. Whereas Sarita et al found 62.19% mild anemia, 29.26% moderate and 8.53% cases in severe anemia group. Whereas Sabita Basu et al reported 69.2% mild anemia, 29.26% moderate anemia and 8.53% anemia of severe degree in female medical students.

On comparing the various parameters like Hb%, MCV, SI, TIBC, TS between anemic and non anemic group, we found difference in all parameters were statistically significant except MCV. This may be due to anisocytosis which is the earliest change seen in peripheral cases of iron deficiency anemia¹⁶.

The major consequences of anemia are increased risk of maternal and child mortality. It results negative effect on physical and mental development, decreased learning and work capacity. At the same time influencing on reproductive health in adolescents and adults^{4,5}. Most of the existing studies point out that anemia among women causes increased risk of low birth weight, inadequate iron store in newborn and decline in mental concentration and physical activity^{17,18}.

Our participants are medical students who need better physical and mental health to cope up the strenuous life style they have to undergo during their undergraduate course in comparison to other university students. Therefore we wanted to assess their iron status. So that anemia can be detected at early stage and the damage can be restricted.

Various studies confirm that serum ferritin is one of the most sensitive methods for assessment of iron stores and for the detection of mild iron depletion¹⁹. In our study mean Serum ferritin level in anemic and nonanemic students were 10.68(SD-1.0) and 13.11 (SD- 0.70) respectively and the difference in ferritin value between these two groups was statistically very significant ($p=0.01$).

IDA is an end stage of negative iron balance. It is preceded by a stage of latent iron deficiency (ID) where serum ferritin is below 15.0 ng/ml with normal Hb level²⁰.

According to body iron status, Among 19 anemic students there were 4 (21%) students, who had frank Iron deficiency anemia. Out of 81 student of non anemic students, 5 (6%) students had Latent anemia. There was 23.9% prevalence of IDA estimated among Saudi young females who were apparently healthy at University stage, in Jeddah province²¹. Whereas prevalence of IDA was 18.58% and LA was 16.51% in a study conducted in Shree Aurobindo Institute of Medical Sciences, Indore¹⁰.

On comparing cases of iron deficiency anemia with those of latent anemia all the parameters showed highly significant except TIBC. Same finding was reported by Sarita et al.¹⁰

Prevalence of 6% of Latent Anemia in medical students suggests the need of screening the vulnerable group of 15-49 years of females even in middle and high socioeconomic class, so that iron deficiency anemia can be prevented by treating these cases in latent anemia stage only.

Conclusion

Prevalence of 21% Iron deficiency anemia in healthy looking anemic students and 6% of latent anemia in non anemic medical girls students suggest that awareness must be increased regarding diet, factors affecting absorption of iron and need for screening for anemia even in middle and high socioeconomic class. At the same time detection and correction of

iron deficiency anemia or latent anemia even in asymptomatic girls students will improve their academic performance and reproductive life in future.

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AETIOLOGICAL ASPECT OF RAJAYAKSHMA IN AYURVEDAA

ANISH KUMAR*

Declaration

The Declaration of the author for publication of Research Paper in The Indian Journal of Research Anvikshiki ISSN 0973-9777 Bi-monthly International Journal of all Research: I, *Anish Kumar* the author of the research paper entitled AETIOLOGICAL ASPECT OF RAJAYAKSHMA IN AYURVEDAA declare that , I take the responsibility of the content and material of my paper as I myself have written it and also have read the manuscript of my paper carefully. Also, I hereby give my consent to publish my paper in Anvikshiki journal , This research paper is my original work and no part of it or it's similar version is published or has been sent for publication anywhere else. I authorise the Editorial Board of the Journal to modify and edit the manuscript. I also give my consent to the Editor of Anvikshiki Journal to own the copyright of my research paper.

Abstract

Ayurvedaa - "science of life and longevity" is considered as the traditional system of medicine of India. The aim of this system is to prevent illness, heal the sick and preserve life. For the fulfillment of second aim of Ayurveda, it is necessary to examine the disease or vyadhi. It is not possible to cure a disease without proper examination. That is why Ayurveda has been described "Trisutra Ayurveda i.e. Hetu, Linga and Aushadha". Hetu was said first in Trisutra, which shows its importance in Ayurveda system of medicine. Hetu or Nidana (causative factor of disease) is also known as "Vyadhi vinishchaya karanam". It is stated in Ayurveda classics that to avoid the cause (hetu) of disease is a first part of treatment of that particular disease. So by using this concept, samprapti (pathogenesis) of disease can also prevent. Thus, a great emphasis is laid on nidana of a disease to understand it completely for prevention as well as effective management.

Key Words: Rajayakshma, Hetu of Rajayakshma, Aetiology.

Introduction

In Ayurveda, health is defined as the state where physical body, senses, and psyche are in original or natural state with respect to body and function¹. The imbalance state of all those are known as Dhatu Vaishamya/ Vyadhi. There are so many diseases (Vyadhi) have been described in Ayurveda. Rajayakshma is also one of them. The complete detail about Rajayakshma such as hetu, samprapti, poorvarupa, rupa, upshaya-anupshaya, management etc. has also been described in Ayurveda. It is a serious public health problem causing immense morbidity, mortality and distress to individuals, families and communities.

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Rajayakshma is considered as king of all diseases². Thus it being termed as Raja(king) Yakshma(decay), which means of frailing condition of huge magnitude. Symptoms of Rajayakshma are parshwashoola, jwara, kasa and raktashthiwana³. In such case all seven Dhatu convert primarily in to Mala and passed away rather than being partly converted to Ojas, which considered as carrier of Prana.

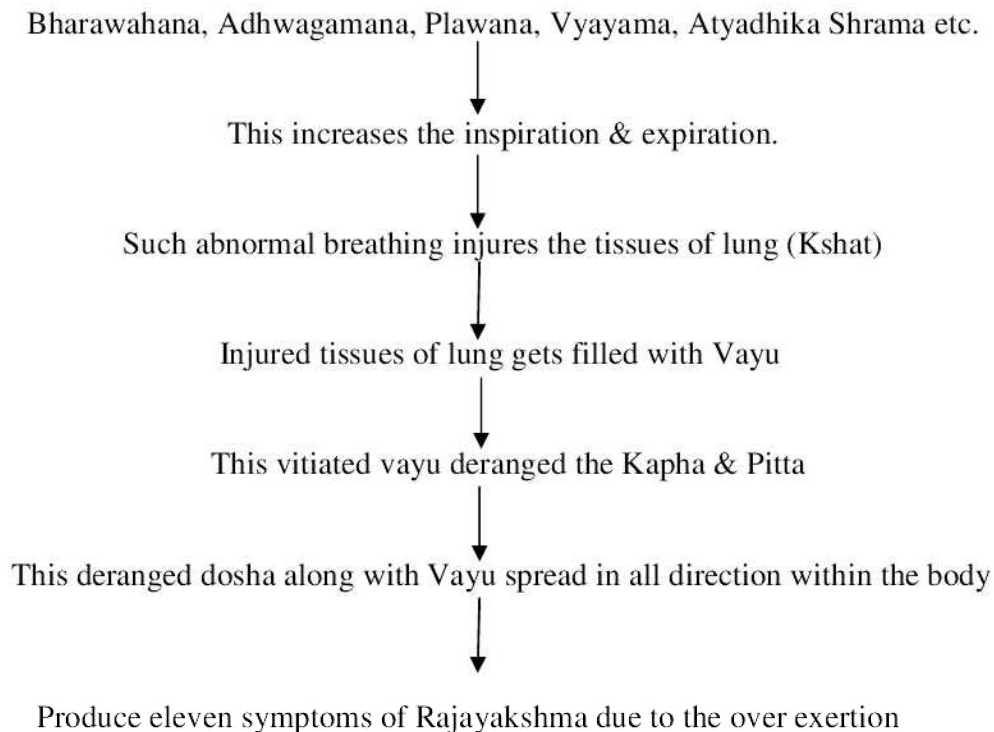
Aetiology of Rajayakshma

Ayurveda has described the four main causes which give rise to Rajayakshma in the human body. It should be understood that these four causes are not directly responsible for the manifestation of disease. These are only primary causes which have a tendency to derange the vata, pitta and kapha of the body and these deranged dosha are directly responsible for the manifestation of the Rajayakshma in the human body. These primary causes are⁴ :

1. Sahasa (over exertion)
2. Sandharana or Vegavidharana (suppression of natural urges)
3. Kshaya (depletion of tissue element)
4. Vishamashana (irregular diet)

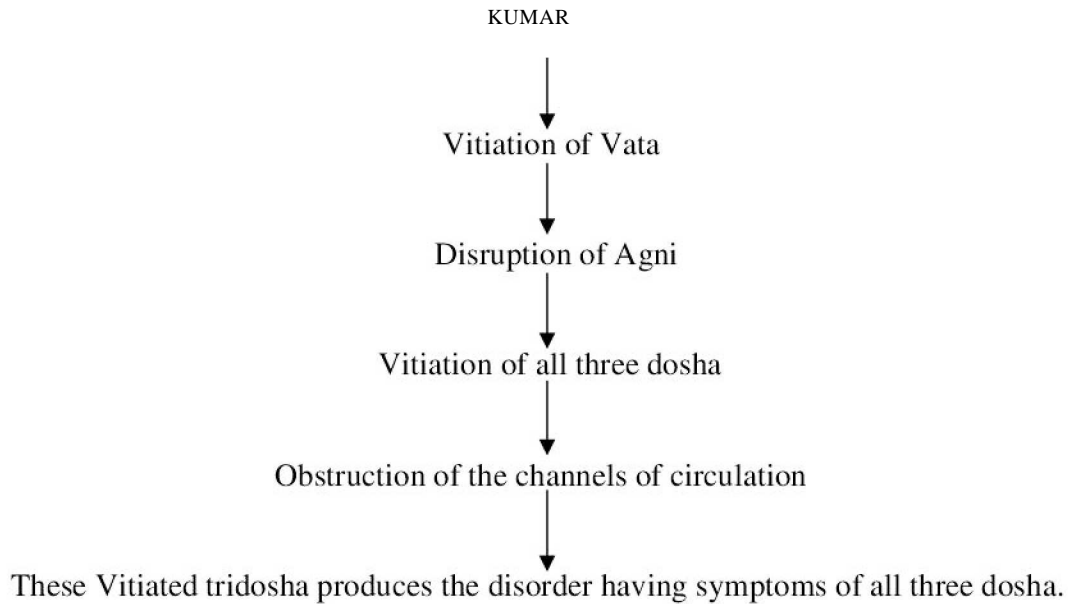
Sushruta has also described Rajayakshma as Aupasargaja vyadhi (infectious disease). The direct physical contact with diseased person, the expelled air by a diseased person, eating-sleeping-sitting together with diseased person, the clothes, garments, flowers, ornaments, cosmetics used by the diseased person- all these factors are responsible for the spread of Aupsargic vyadhi from one person to other⁵.

1. Rajayakshma due to Sahasa (excessive physical exertion)⁶



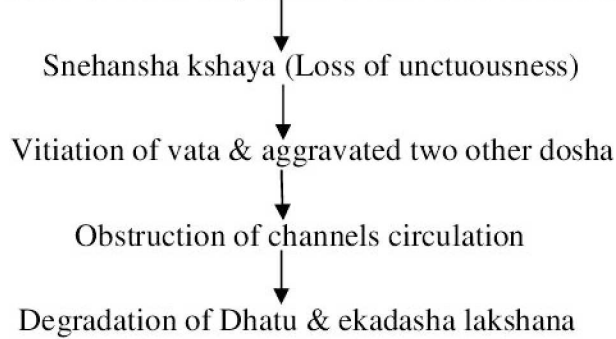
2. Rajayakshma due to Sandharana/Vegavidharana (suppression of natural urges)⁷

Mutra, Purisha, Apana vayu vega dharana



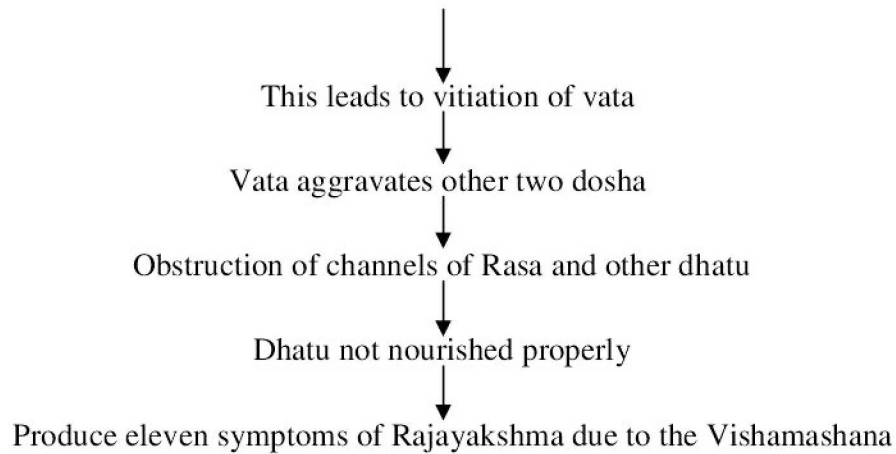
3. Rajayakshma due to Kshaya (wasting)⁸

Ativyavaya, Anashana, Rakta srava, Irshya, Dwesha, Utkantha, Shoka, Bhaya, Krodha etc



4. Rajayashma due to Vishamashana (irregular diet)⁹

A person who takes food against the Ashta-Ahara-Vidhi Visheshayatana and Dasha Vidhi Vidhana



Pathogenesis (Samprapti) of Rajayakshma

Sushruta has described a common samprapti for all the four primary causes of Rajayakshma¹⁰. According to this, obstruction of the nutrition carrying channels predominantly by kapha dosha leads to the depletion of all the dhatu (tissues) of the body. This is called “Anuloma Kshaya”.

Indulgence by a person in excessive sexual intercourse (Ativyavaya) and excessive loss of semen (Shukra dhatu) also leads to the wasting of proximate dhatu resulting in depletion of all the dhatu (tissues) of the body. This is called “Pratiloma Kshaya”.

In both cases, the patient ultimately develops the disease Rajayakshma.

Conclusion

On the basis of above mentioned description we can conclude that Rajayakshma has been a menace to mankind since time immemorial. The detail description was quite later described and could be properly obtained during the Samhita Kala in almost all the classic texts of Ayurveda. All of these have enumerated only four causative factors of Rajayakshma, namely Sahasa (over exertion), Sandharana (suppression of natural urges), Kshaya (wasting) and Vishamashana (irregular dieting). These texts also in detail elaborated the specific pathogenesis according to the causative factors.

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ANALISIS OF ACTIVE POWER FILTERS FOR IMPROVED POWER QUALITY

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Declaration

The Declaration of the authors for publication of Research Paper in The Indian Journal of Research Anvikshiki ISSN 0973-9777 Bi-monthly International Journal of all Research: We, *Udit Kumar Yadav and Som Nath Pathak* the authors of the research paper entitled ANALISIS OF ACTIVE POWER FILTERS FOR IMPROVED POWER QUALITY declare that , We take the responsibility of the content and material of our paper as We ourself have written it and also have read the manuscript of our paper carefully. Also, We hereby give our consent to publish our paper in Anvikshiki journal , This research paper is our original work and no part of it or it's similar version is published or has been sent for publication anywhere else. We authorise the Editorial Board of the Journal to modify and edit the manuscript. We also give our consent to the Editor of Anvikshiki Journal to own the copyright of our research paper.

Abstract

This paper describes different power quality problems in distribution systems and their solutions with power electronics based equipment. Shunt, hybrid and series active power filters has been described to show their compensation characteristics and principles of operation. Different power circuits topologies and control scheme for each type of active power filter has been analyzed. The compensation characteristics of each topology with the respective control schemes has been studied using simulation and experimentally.

Index Terms : Filter, Power filters, & Power electronics

I. Introduction

There are wide range of equipments, of microelectronic processor from home VCRs and digital clocks to automated industrial assembly lines and hospital diagnostics systems has increased the vulnerability of such equipment to power quality problems ¹. These Problems include a variety of electrical disturbances, which may originate in several ways and have different effects on various kinds of sensitive loads. What were once considered minor variations in power, usually unnoticed in the operation of conventional equipment, may now bring whole factories to stand still. As a result of this vulnerability, increasing numbers of industrial and commercial facilities are trying to protect themselves by investing in more sophisticate equipment to improve power quality ². Moreover, the proliferation of nonlinear loads with large rated power has increased the Contamination level in voltages and currents waveforms, forcing to improve the compensation characteristics

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required to satisfy more stringent harmonics standard³⁻⁴. Between the different technical options available to improve power quality, active power filters have proved to be an important alternative to compensate for current and voltage disturbances in power distribution systems⁵⁻⁷. Different active power filters topologies have been presented in the available literatures,⁸⁻⁹ and many of them are already available in the market¹⁻². In this paper, Shunt active power filters, series active topologies, and hybrid schemes will be presented and analyzed. The control scheme characteristics for shunt and series schemes will also be discussed. Finally, steady state and transient results for dynamic compensation, obtained from simulated and experimental setup will be studied.

II. Power Quality in Power Distribution Systems

Most of the more important international standards define power quality as the physical characteristics of the electrical supply provided under normal operating conditions that do not disrupt or disturb the customer's processes. Therefore, a power quality problem exists if any voltage, current or frequency deviation results in a failure or in a bad operation of customer's equipment. However, it is important to notice that the quality of power supply implies basically voltage quality and supply reliability. A voltage quality problem relates to any failure of equipment due to deviations of the line voltage from its nominal characteristics, and the supply reliability is characterized by its adequacy (ability to supply the load), security (ability to withstand sudden disturbances such as system faults) and availability (focusing especially on long interruptions). Power quality problems are common in most of commercial, industrial and utility networks. Natural phenomena, such as lightning are the most frequent cause of power quality problems. Switching phenomena resulting in oscillatory transients in the electrical supply, for example when capacitors are switched, also contribute substantially to power quality disturbances. Also, the connection of high power non-linear loads contributes to the generation of current and voltage harmonic components. Between the different voltage disturbances that can be produced, the most significant and critical power quality problems are voltage sags due to the high economical losses that can be generated. Short-term voltage drops (sags) can trip electrical drives or more sensitive equipment, leading to costly interruptions of production¹⁰. For all these reasons, from the consumer point of view, power quality issues will become an increasingly important factor to consider in order satisfying good productivity. Through the reduction of power quality related process stoppages and energy suppliers trying to maximize operating profits while keeping customers satisfied with supply quality, innovative technology provides the key to cost-effective power quality enhancements solutions. However, with the various power quality solutions available, the obvious question for a consumer or utility facing a particular power quality problem is which equipment provides the better solution.

III. Solutions to Power Quality Problems

There are two approaches to the mitigation of power quality problems. The first approach is called load conditioning, which ensures that the equipment is less sensitive to power disturbances, allowing the operation even under significant voltage distortion. The other solution is to install line conditioning systems that suppress or counteracts the power system disturbances. A flexible and versatile solution to voltage quality problems is offered by active power filters. Currently they are based on PWM converters and connect to low and medium voltage distribution system in shunt or in series. Series active power filters must operate in conjunction with shunt passive filters in order to compensate load current harmonics.

IV. Shunt Active Power Filters

Shunt active power filter compensate current harmonics by injecting equal-but-opposite harmonic compensating current. In this case the shunt active power filter operates as a current source injecting the harmonic components generated by the load but phase shifted by 180° . This principle is applicable to any type of load considered a harmonic source. Moreover, with an appropriate control scheme, the active power filter can also compensate the load power factor. In this way, the power distribution system sees the non linear load and the active power filter as an ideal resistor. The current compensation characteristic of the shunt active power filter is shown in Fig. 1

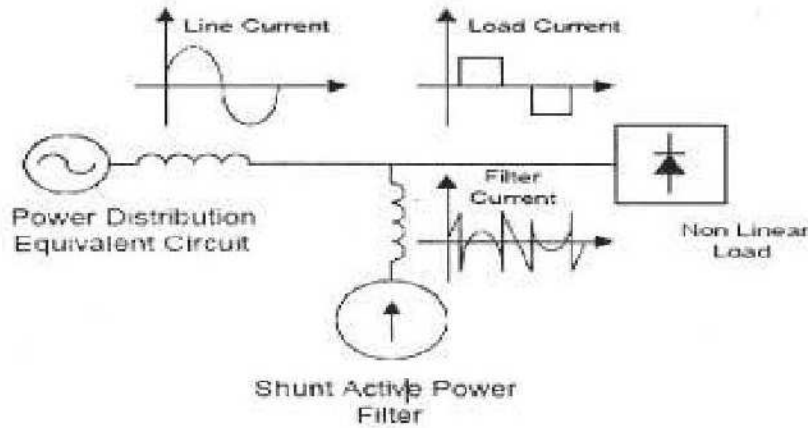


Fig. 1 Compensation characteristics of a shunt active Power filter

V. Power Circuit Topology

Shunt active power filters are normally implemented with pulse-width modulated voltage source inverters. In this type of applications, the PWM-VSI operates as a current controlled voltage source. Traditionally, 2 levels PWM-VSI has been used to implement such system. However, in the past years multilevel PWM voltage source inverters have been proposed to develop active power filters for medium voltage applications. Also, active power filters implemented with multiple VSI connected in parallel to a dc bus but in series through a transformer or in cascade has been proposed in the technical literature.

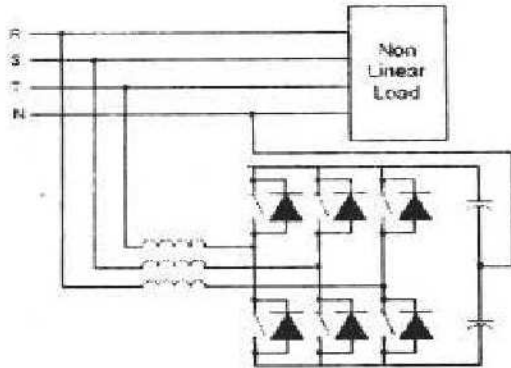


Fig. 2 Shunt active power filter topologies implemented with PWM Voltage source inverters

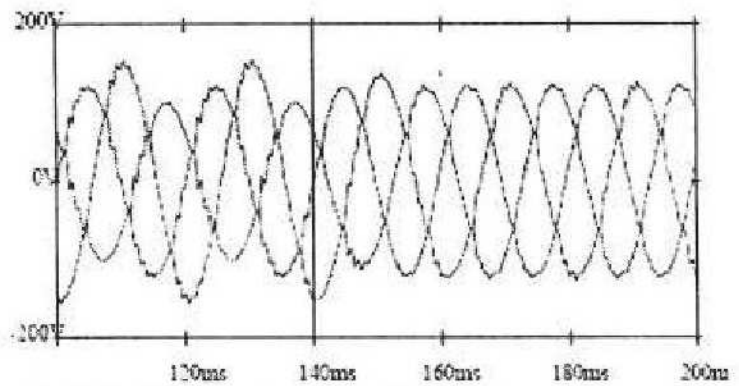


Fig. 3 Simulated waveforms for voltage unbalance compensation.

The use of VSI connected in cascade is an interesting alternative to compensate high power non-linear load. The use of two PWM-VSI of different rated power allows the use of different switching frequencies, reducing switching stresses and commutation losses in the overall compensation system.

V. Series Active Power Filters

It is well known that series active power filters compensate current system distortion caused by non-linear loads by imposing a high impedance path to the current harmonics which forces the high frequency currents to flow through the LC passive filter connected in parallel to the load⁵. The high impedance imposed by the series active power filter is created by generating a voltage of the same frequency that the current harmonic component that needs to be eliminated. Voltage unbalance is corrected by compensating the fundamental frequency negative and zero sequence voltage components of the system.

VI. Simulated Results

The viability of the proposed series active power filter has been verified by simulation using PSPICE. Relevant results are shown in Fig. 3 and 4. In particular, Fig. 4 shows the effect of voltage compensation with the current harmonic generator circuit not working, while in Fig. 5, only the current harmonic compensator scheme is operating the series active power filter is compensating voltage unbalances and current harmonic components simultaneously. The simulation circuit is compensating three single phase non controlled rectifiers, each one connected between phases to neutral. The series active power filter starts compensating at 140 ms.

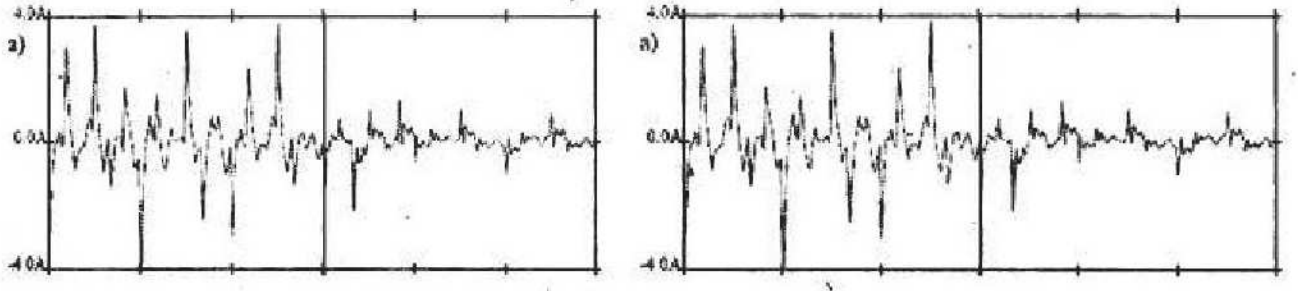


Fig. 4. Simulated waveforms for current harmonic compensation. a) Neutral current flowing to the ac mains before and after compensation. b) Line currents flowing to the ac mains before and after compensation. (Voltage unbalance compensator not operating).

VI. Experimental Results

In order to validate the compensation scheme proposed in this paper, a 5 KV A prototype was implemented and tested for different operating conditions. Figure 5 shows the current waveforms when the series active power filter is not working. Specially Fig. 5-a shows the load current, 5-b illustrates the current that flows to the passive filter and Fig 5-c shows the power system. The passive LC filter was tuned at 250 Hz ($L_{f5}=6,22$ mH; $C_{f5}=65$ F) and 350 Hz ($L_{f7}=3,17$ mH ; C_{f732} F). Also this figure shows that the THD of the passive filter current increases while the THD of the source current decreases due to the compensation characteristics of the proposed series active power filter.

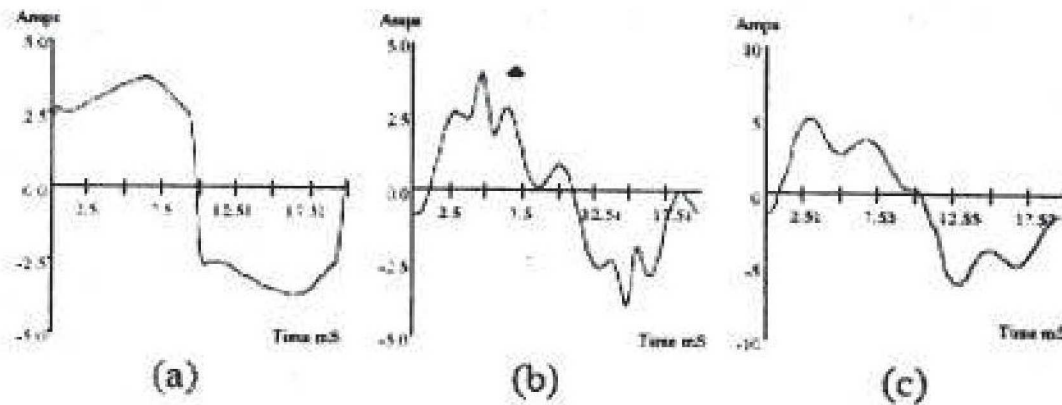


Fig. 5 Experimental current waveforms of the system Time mS without the operation of the series active power filter. (a) Load current. (b) Shunt passive filter current. (c) System current. Compensated source current.

VII. Conclusion

The use and advantages of applying active power filters to compensation power distribution systems has been presented in this paper. The principles of operation of shunt, series, and hybrid active power filters has been presented. Also, a brief description of the state of the art in the active power filter market has been described. The shunt active power filter performance under fault power distribution system was discussed.

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