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Mechanism of *Jwara* leading to *Raktapitta* - A Review Article

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ABSTRACT

In the present era, many people rely on internet for treatment when they are initially affected by a disease. Many a time people approach physician only when they are afflicted with multiple conditions. In *Ayurveda* a disease leading to another disease is explained in the concept of *Nidanarthakararoga,* when the latter disease is treated it can only temporarily relieve the condition, by understanding the concept of *Nidanarthakararoga*, planning the treatment for former disease helps in managing both the condition. This article is a preliminary effort to analyze the concept of *Nidanarthakararoga* and *Nidanartakaratva of Jwara* leading *to Raktapitta* by thorough evaluation of *Ayurvedic* classics (*Bruhatrayee & Madhava Nidana*) and understanding them through contemporary science. Understanding the mechanism is very essential in diagnosing and its management.

Key words: *Nidanarthakararoga, Nidana, Jwara, Raktapitta.*

INTRODUCTION

Deviation from normal functioning of body is disease. *Nidana* (etiology) is the prime factor responsible for onset of such deviation and manifestation of disease. Various classification of *Nidana* have been mentioned in *Ayurveda* depending on the role they play in the manifestation of disease; one such unique concept is *Nidanarthakararoga* regarding the pathogenesis of disease. The changes that occur due to a disease may act or mimic as *Nidana* for the manifestation of another disease is termed as *Nidanarthakararoga.*[1] Because the first line of any disease is *Nidana Parivarjana* i.e., ceasing *Nidana* and thus helps in reducing further aggravation of *Dosha* (fundamental energy) and avoidance of such factors may yield successful result.[2] Understanding the concept of *Nidanarthakararoga* is very essential for management of disease.

Why is it called *Nidanarthakararoga* and not *Nidana*?

The word *Nidanarthakararoga* consists of 3 words *Nidana* (causative factor), *Arthakara* (which acts like), *Roga* (disease), which means the disease which acts like *Nidana* is *Nidanarthakararoga.*

In this article the *Nidanartakaratva* of *Jwara* (fever)in *Raktapitta* (bleeding disorders) has been explored as *Jwara is* one such disease where *Deha* (body)*, Indriya* (sense organs) and *Manas* (mind) are involved, among all *Roga, Jwara* is the *Pradhanaroga* [3] and the *Rakta* which is vitiated by *Pitta* is called *Raktapitta.*[4] Understanding the pathogenesis of *Raktapitta* caused by *Jwara* has been described in the article.

AIM AND OBJECTIVES

1. To analyze the *Nidanartakaratva* of *Jwara* leading to *Raktapitta.*

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2. To understand pathogenesis of bleeding disorders caused by fever.

Literature Review

The concept of *Nidanarthakararoga* i.e., disease leading to another disease is explained in *Charaka Samhita, Nidanastana, Apasmaranidana Adhyaya*. for example, elevated temperature in *Jwara* can cause *Raktapitta* and *Raktapitta* can cause *Jwara.* Both the diseases (i.e. *Jwara* and *Raktapitta*) may lead to *Shosha* (depletion of *Dhatu*).[1] *Madhavakara* opines the same in *Panchanidana Lakshana Adhyaya.*[5]

Discussion

Analyzing the mechanism of *Jwara* leading to *Raktapitta*

It can be understood as follows;

In classical texts it has been mentioned that '*Santapa* (increased temprature*)* of *Jwara'* leads to manifestation of *Raktapitta.*[1] *Chakrapani* in *Tika* (commentary) says *Ushnaguna* causes *Jwara* and & if such substances are excessively used or other substances having properties conducive to the production of *Raktapitta* are simultaneously used then it results in the production of *Raktapitta.*

Both *Jwara* and *Raktapitta* are *Pittapradhanajanyavyadhi* i.e., *Pitta* is responsible for the manifestation of *Jwara and Raktapitta. Jwara* does not manifest without *Ushma*, *Ushma* does not exist without *Pitta* in body.[6]

Generally, for the manifestation of any disease there must be involvement of *Nidana*, *Dosha*, *Dushya* and *Srotovaigunya.*

The *Raktaprakopakanidana* mentioned in *Sushruta Samhita Sutrastana* include aggravation of *Rakta* by same causes which aggravates *Pitta* frequently, by food which are *Drava, Snigdha, Guru, Divaswapna, Krodha, Anala* (exposure to fire), *Atapa* (exposure to sunlight), *Shrama, Abhighata, Ajirna, Viruddha Adhyashana.*[7]

The *Raktavaha Sroto Vaigunya Nidanas* mentioned *in Charaka Srotonidana* include food which causes *Vidaha, Snigdha, Ushna, Drava, Atapa* and *Anala.*[8]

By analysing the above references it's clear that *Pitta Prakopakanidana, Ushna, Anala* and *Atapa* does vitiation of *Rakta* and *Raktavahasrotas*. Therefore, *Rakta* and *Raktavahasrotas* gets vitiated by *Ushnaguna* of *Prakupita Pitta* which is already present in *Jwara*, all these factors thus act as *Nidana* for *Raktapitta.*

Table 1: *Samprapti* of *Raktapitta* caused by *Jwara* occurs as mentioned in the table.

Due to *Prakupita Pitta* in *Jwara*
↓
Rakta and *Raktavahasrotas* gets vitiated by
Ushna and *Thikshna Guna* of *Pitta*
↓
Here the *Prakupita Pitta* gets accumulated in *Raktavahasrotas* due to *Raktavahasrotovaigunya* takes *Sthanasamshraya* in *Viguna/Shithila Dhatu* i.e., *RaktaDhatu*
↓
Results in manifestation of *Raktapitta*

Physiologically *Pliha* (spleen) and *Yakrut* (liver) is considered as *Mula* (origin) of *Raktavahasrotas*, where formation and transportation of *Rakta* takes place.[9] It is said that *Rasa Dhatu* on reaching the *Pliha* and *Yakrut* gets *Ranjana* by the action of *Ranjakapitta* and transformed in to *Raktadhatu*. So *Raktadhatu* is formed by *Rasadhatu* in *Pliha* and *Yakrut*.[10]

Therefore, *Prakupita Pitta* and *Dushita Rasa Dhatu* in *Jwara* may enter *Raktavaha Srotomula i.e., Pliha & Yakrut,* vitiating the *Raktadhatu* and increasing the quantity of *Raktadhatu* there, due to its similarity with *Pitta*.[11]

And thus, *Jwara* may lead to *Raktapitta,* because of involvement of *Pitta Dosha* in both *Vyadhi,* and successive *Dushya* and *Srotas*, i.e., *Rasa Dhatu* in *Jwara* and *Raktadhatu* in *Raktapitta,, Rasavahasrotas* in *Jwara* and *Raktavahasrotas* in *Raktapitta.*

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Table 2: Showing the relationship of *Dosha, Dushya* and *Srotas* involved in *Jwara* and *Raktapitta.*

	Jwara[12]	***Raktapitta***[13]
Dosha	*Pitta Pradhana Tridosha*	*Pitta*
Dushya	*Rasadhatu*	*Raktadhatu*
Srotas	*Rasavahasrotas, Swedavahasrotas*	*Raktavahasrotas*
Srotodushti	*Sanga*	*Atipravrutti, Vimargagamana*

The manifested *Raktapitta* caused by *Jwara* exhibits in the following form.[14]

- *Urdwaga Raktapitta* (bleeding from Upward tracts) is where bleeding takes place through nostrils, eyes, ears, mouth in the form of Epistasis, hematemesis, otorrhagia.
- *Adhoga Raktapitta* (bleeding from downward tracts) takes place through urethra, anus and vagina in the form of hemorrhoids, anal bleeding, melena, hematuria, menorrhagia or metrorrhagia.
- When there is extreme aggravation of this disease, bleeding takes place from everywhere in the form of DIC (disseminated intravascular coagulation) called *Ubhaya Raktapitta.*

Understanding pathogenesis of bleeding disorders caused by fever

There are 2 reasons for elevated body temperature according to modern, one is fever or pyrexia which is elevated body temperature due to increased hypothalamic set point caused by inflammatory cytokines.[15] Hyperthermia is another reason and is defined as elevated body temperature that is not due to elevated hypothalamic set point i.e., not in response to inflammation.

In some patients with fever or hyperthermia, hemorrhage is a pathological significant feature, which incurs severe or even fatal consequence. Although the mechanism of hemorrhage in patients with hyperthermia and fever have been complex, whether there is an association between hemorrhage and hyperthermia or fever is not well understood, platelets play a central role in maintaining integrity of endothelium and biological homeostasis.[16]

Generally, the causes of hemorrhagic diatheses may be or may not be related to platelet abnormalities, these causes are broadly divided into the following groups.[17]

1. Due to vascular abnormality
2. Related to platelet abnormalities
3. Coagulation defects
4. Fibrinolytic defects
5. Combination of all these as occurs in DIC

Bleeding due to vascular abnormality arise from damage to the capillary endothelium, abnormalities in the sub endothelial matrix or extra vascular connective tissue that supports the blood vessels or from formation of abnormal blood vessels. Here in case of fever there might be many possible mechanisms which might lead to bleeding, they are as follows.

In fever there is excess adhesion of platelets and platelet aggregation, which leads to widespread microvascular thrombosis leading to excess consumption of clotting factors and platelets leading to consumption coagulopathy or DIC. The increase adhesion and aggregation are caused by inflammatory cytokines such as IL1, IL6, TNF, IFNα**,** PGE_2, complement activation & release of vasoactive mediators.[18] Prostaglandins E2(PGE_2) is produced by activated platelets and by several other cells including capillary endothelial cells. Recent studies have shown that PGE_2 exerts dual effect on platelets i.e., inhibitory or potentiating effects, when it acts as inhibitory it could slow the growth of the associated thrombus by increasing the threshold for activation of circulating platelets and when it acts as potentiating the platelet aggregation action may be enhanced and which then leads to microvascular thrombosis and consumption coagulopathy.[19]

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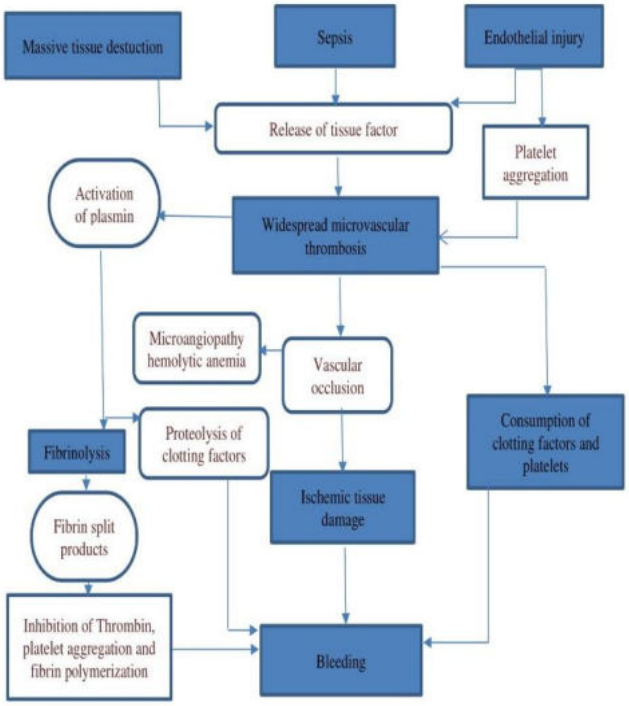
Figure 1: The mechanism of fever leading to hemorrhage is as follows.[20]



The damage to endothelium may be caused by inflammatory mediators such as pyrogenic cytokines such as IL 1, IL6, TNF, IFNα, PGE_2 and activation of complementary system. These factors increase vascular permeability, vasodilatation and hemorrhage need not takes place in all case of fever as the repair of damaged tissues are brought about by platelets and coagulation system. But when the stimuli are more and there is more damage to the vessel and body fails to repair the damage, the consequence may be bleeding.

Hyperthermia induces platelet dysfunction and platelet apoptosis suggesting the possible reason for decreased platelets count and dysfunction this could be the reasons for pathogenesis of hemorrhage in hyperthermia related diseases.[21]

Possibly triggered by immunopathological mechanism i.e., excessive immune response leading to increased pro-inflammatory cytokines.

Elevated Cytokines i.e., cytokine storm also leads to elevated liver enzymes, hemostatic abnormalities and GI bleeding.

Therefore, fever may lead to bleeding disorders by above said mechanisms

Conclusion

Nidanartakararoga is the important concept regarding the pathogenesis of disease. *Nidanartakaratva* of *Jwara* in *Raktapitta* is caused by *Ushnaguna* of *Prakupita Pitta* in *Jwara* that vitiates *Rakta Dhatu* and also causes *Raktavaha Srotovaigunya* which results in manifestation of *Raktapitta.* Thus, understanding the *Samprapti* of *Nidanartakararoga* helps in *Samprapti Vighatana* which is *Chikitsa*. Fever leading to bleeding disorders may have involvement of increased pro inflammatory cytokines which causes platelet dysfunction, vascular abnormality, coagulation defects and fibrinolytic defects.

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