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Abstract: The classical texts of Ayurveda have described Prameha as a group of disorders of the urinary system. Each sub type of Prameha has been defined on specific characteristics of abnormal urine. Classification of Prameha is based on different perspectives such as Genetics, Environmental Factors, Behavioural Changes and Food Habits. Nosology of diseases has been made on the basis of pathophysiology, manifestation of clinical features, and characteristics of the abnormal urine. Each sub type is, therefore, not identical with the conditions mentioned in the classification of diseases in Modern Medicine. For instance, the view of many scholars that the Diabetes Mellitus as Madhumeha, is an incorrect interpretation because Madhumeha does not represent entire clinical course of Diabetes Mellitus. Madhumeha is a fatal condition, which represents a particular stage of Diabetes Mellitus and other diseases of the Kidney. The pathogenesis of prameha is described on the basis of Dosa - Dhatu - Mala Theory. Early stage of the disease manifests clinically due to the vitiation of Kapha predominantly. Gradual development of the disease may occur manifesting the features of vitiated Pitta and Vāta on the influence of aggravating factors and inadequate attention in the management.

Introduction
Ayurveda mentions three major vital places of the body as Trimarma, which includes Hṛdaya, Śīrṣa and Vasti. Prameha, which is a group of diseases of Vasti (Urinary System) is characterized by excessive passing of turbid urine.

The term “Prameha” is derived from the root of Sanskrit language “Mih - Kṣaraṃ”, which means passing of urine. The prefix “Pra” stands for excessiveness. Therefore, the term “Prameha” literally stands for excessive passing of urine. Excessive passing of urine – Prabhū tamutrātā and the Turbidity of urine - “Āvīlamū tratā” are main characteristic features of “Prameha”. Therefore, the condition “Prameha” can be basically defined as “a group of diseases of any cause, which manifests “excessive passing of urine with or without turbidity of urine”.

The Classification of Prameha
Prameha is included in the category of Mahārūga, which consists of the most fatal conditions that are incurable - (Su.Ci.14.11). Classification of Prameha has been made on the basis of quantitative and qualitative analysis of urine. The classical texts of Ayurveda, Carakasarhita, Susrutasahità and Aṣṭāṅghardayasahità mention the 20 sub - types of Prameha and different technical terms have been used in the nosology of few conditions - (CS.Ni.4.3, CS.Ci.6.6, SS.Ni.6.26, AS Ni 10.8). On the aetiological basis, Prameha is divided into two categories as Congenital (Prakṛti) and Acquired (Svākṛta). The congenital type of Prameha is caused by hereditary and nonhereditary defects of the ovum and sperm - (SS.Ci.11.03).

On the basis of pathophysiology, all types of Prameha are the results of vitiation of tridōṣa and they are categorized into three groups namely Kapāja-prameha, Pittajaprameha and Vātajaprameha according to the predominant dōṣa - (CS.Ni.4.3, SS.Ni.6) and each category is divided into sub types on the basis of the characteristics of urine.
Aṣṭhāṅgahṛdayasāṃhitā does not refer to the conditions such as Ṛṣubālikārasameha, Sāṇḍraprasādameha, Śuklameha, Aīlāmeha, Lavārāmeha, but it refers to the terms Ikṣumeha, Sāndrameha, Lālāmeha. Ṣoṇītameha has been replaced by Rakṣameha, a synonym of Ṣoṇītameha in addition to the other types of Pittajāprameha in Carakasāṃhitā. Aṣṭhāṅgahṛdayasāṃhitā has followed the Carakasāṃhitā in classifying the Vātaja Prameha.

Kapṭaja Prameha
Kapṭaja prameha, which includes ten types of Prameha namely Udakameha, Ikṣubālikārasameha (Ikṣumeha), Sāndrameha, Sāndraprasādameha, Śuklameha, Suṇkrameha, Śītameha, Śānairameha, Sīkatameha, and Lālāmeha - (CS.Su.19.3.91, CS.Ni.4.102). Suṣruta refers to the terms Piṣṭameha, Surāmeha, Lavaṃjameha, Pherameha - (SS.Ni.6.1027) instead of Sāndraprasādameha, Śuklameha, Śītameha, Aīlāmeha of Carakasāṃhitā while Aṣṭhāṅgahṛdayasāṃhitā refers to Udakameha, Ikṣumeha, Sāndrameha, Suṇkrameha, Śītameha, Śānairameha, Sīkatameha, Piṣṭameha, Surāmeha, and Lālāmeha - (AHS.Ni.10.8-13).

Pittaja Prameha
Pittaja prameha, which includes six types of Prameha namely Kaśāameha, Kālameha, Niṃlameha, Lōhitameha, Māṇīḍhaṭameha and Hāridameha - (CS.Su.19.123, CS.Ni.4.253). Suṣruta refers to the terms Aṃlameha and Ṣoṇītameha (SS.Ni.6.1127) instead of Kālameha and Lōhitameha of Carakasāṃhitā, while Aṣṭhāṅgahṛdayasāṃhitā has followed the Carakasāṃhitā but Lōhitameha has been replaced by Ṣoṇītameha of Suṣrutasāṃhitā - (AHS.Ni.10.14-15).

Vātaja Prameha
Carakasāṃhitā includes four types of Vātaja Prameha, namely Vasāmeha, Maḷāmeha, Hastimeha and Madhumēha - (CS.Su.19.121, CS.Ni.4.91, CS.Ci.6.97). Suṣrutasāṃhitā refers to the terms Sapīrmeha and Kaṣāudrāmeha - (SS.Ni.6.1227) instead of Maḷāmeha and Madhumēha of Carakasāṃhitā while Aṣṭhāṅgahṛdayasāṃhitā has followed Carakasāṃhitā (AHS Ni 10.16-18).

Aetiology of Prameha
Origination of Prameha is symbolically expressed in Carakasāṃhitā as it occurred due to excessive drinking of Ghee (Haviṣa) when the Lord Dakṣa was destroying the sacrifice - (CS.Ni.8.118). The aetiological factors mentioned in classical texts are common for all types of Prameha. Aetiological factors can be classified according to the nature of effect on the kidney. Suṣrutasāṃhitā has emphasized two categories: Hereditary and Acquired. Hereditary causes include the defects of Bīja (Sperm or Ovum). Acquired causes of Prameha include inappropriate food and life style - (SS.Ci.11.03).

Genetic Factors
Suṣrutasāṃhitā has identified the genetic involvement in pathogenesis of Prameha - (SS.Ci.11.03). Carakasāṃhitā mentions that, in describing the prognosis of Prameha, genetic involvement of the disease is a cause of poor prognosis. Further Cākrāpanidatta, the great commentator of Carakasāṃhitā, also elaborates that the Prameha may be hereditary or congenital due to defects of Bīja (Sperm or Ovum) - (CS.Ci.6.57).

Carakasāṃhitā states that congenital type of diseases can occur due to defect in bīja, bijabāga or bijabhāgavayava (CS Sa.4.30). The bīja, bijabāga and bijabhāgavayava can be compared with Ovum and Sperm, Chromosomes and Genes respectively. Cākrāpanidatta comments that this defect is due to the indulgence in inappropriate foods at the time of pregnancy. Carakasāṃhitā further states that excessive use of sweet taste during pregnancy may cause birth to a child affected with Prameha and obesity (CS Sa.8.21). Genetic influence and factors that affect the foetal nutrition are the primary causes of Prameha. In comparison to the modern medicine, Diabetes Mellitus is a leading disease, which shows abnormalities in the urine and causes renal damage. Genetics involvement is accepted as a significant aetiological factor - Level "A" evidence6 Monogenic forms and susceptibility genes have also been identified in both forms of Diabetes Mellitus Type 1 and Type 2.
Non-Genetic Factors

Nutrition:
Epidemiological studies have reported a higher incidence of Type 2 Diabetes Mellitus in subjects with a low birth weight. The hypothesis that nutrition of the mother can profoundly affect the metabolic outcome of the offspring has been confirmed by elegant mechanistic animal studies. Low birth weight is accepted as a significant aetiological factor—Level "A" evidence. Poor nourishment of the foetus increases the risk of metabolic syndrome and Type 2 Diabetes Mellitus and postnatal over-nutrition may aggravate the syndrome.

Food Habits
Excessive utility of foods that increases body weight, fat content of the body (CS.Ni.4.14') and foods that are acid, salt - (CS.Su.17.38') and sweet - (SS.Ni.6.37') in taste are main causes of Prameha.

Excessive utility of food that possesses the properties such as Sīta and Snigdha - (SS.Ni.6.37') and rice prepared from recent harvest, water obtained from recent rain, lead to increase the constituents such as Ślesma, Pitta, Medas and Māṃsa - (CS.Su.17.38'). These conditions affect the proper function of vāta. The vitiated vāta attracts oja and propels it into vasti, which causes Madhumeha (CS.Su.17.38', CS.Su.17.78-82'), which is the most difficult to cure and is the fatal state of the clinical course of Prameha.

Excessive use of food that are sweet in taste, excessive use of rice obtained from recent harvest, recently prepared alcohol, meats obtained from terrestrial animals (Ānūpe) and aquatic animals (Audaka) and dairy products, sweets prepared from Jaggery and Piṣṭaka (foods prepared from flour) etc are the causes of over nutrition (CS.Su.23.2').

According to the modern research, which confirms the facts mentioned in ancient Ayurvedic texts, high frequency of intake of foods rich in carbohydrate, protein or nitrosamine compounds too will increase the risk of insulin dependent diabetes in human.

Proteins from cows' milk may trigger the autoimmune response that destroys Beta cells of pancreas in laboratory rats. It has been suggested that proteins in cows' milk are also risk factors for human diabetes. Children who develop diabetes are often breast fed for a shorter period.

Behaviour
Excessive sleeping, desire for sleeping during the day time, indulgence in long-term sitting, lack of exercise (sedentary life style) - (CS.Ni.4.14'), lack of thinking, lack of medicinal purifications, desire for Prameha Piṭakā - (CS.Su.17.3-4', CS.Su.17.38', CS.Su.23.2', SS.Ni.6.37'), in addition to, Kota, Kandu, Pāṇḍu, Jvara, Kuṣṭha, Visūcika derived from Āma, Mūtrakṛcchra, Arocaka, Tandrā, Dvajabhaṅga, Atistūlata (Obesity), Lazy ness, Heaviness of the body, Indriyas and Srotas filled with Mala, Difficulty in concentration of mind, Thoughtfulness, Oedema and other related conditions - (CS.Su.23.2').

Secondary Causes of Prameha

Obesity
Obesity can act as a secondary cause in the genesis of Prameha - (CS.Ni.4.14'). Obesity and Leanness depend on the state of Rasa (Nutrients). Excessive use of food that cause the increase of Kapha, excessive repetition of intake of meal, absence of exercises and sleeping during the day time are the reasons of obesity, which leads to serious complications such as Prameha, Vidradhi, Piṭakā, Svāsa and Vātavyāḍhi etc - (SS.Su.15.38').

Modern investigations show that there is global epidemic of obesity affecting all ages and is associated with insulin resistance, impaired glucose tolerance and cardiovascular diseases. Physical inactivity is independently associated with increased insulin resistance. Lifestyle changes in subjects with impaired glucose tolerance decreases progression to Diabetes.
Mellitus. Physical inactivity has also been accepted as a significant aetiological factor – Level "A" evidence⁴.

Functional and Organic Defects of Urinary System
The retroad action of Vātā due to the functional and organic defects of urinary system (Vasti) leading to urinary retention cause Prameha, Muṣraddoṣa (abnormalities of urine), Śukraddoṣa (abnormalities of semen and seminal fluid), Muṣrāghāta (obstructions of the urinary system) - (SS.Ni.3.27²). Asmarī (urinary calculi) too is one of the leading causes of Prameha specially Sikatāmeha, Sarkarāmeha and Bhaṣmākhyameha (SS.Ni.3.13-15²).

Stress
Evidences from animal studies and mechanistic studies suggest a relationship between stress and insulin resistance with predisposition to Type 2 Diabetes Mellitus and it has been accepted as an aetiological factor – Level "B" evidence (Partial acceptance subject to confirmation⁴).

Iatrogenic Causes of Prameha
Administration of medical procedures and medicines, which are liable to cause renal damage may produce Prameha. Indication of Dhāraka Ausadha (Antidiarrhoeal Drugs) is an example - (Su.Ut.40.29 – 30²). According to modern investigations, many chemicals, which are administered as medicine, are identified as causes of renal damage.

Aetiology of Śīśmaja Prameha
Carakasarśhitā refers to the specific aetiology in respect to the major categories of Prameha. Food and changes in lifestyle are the predominant causes of Kaphaja Prameha, in which Ikṣumēha is included. According to Carakasarśhitā, aetiology of Śīśmaja Prameha includes;

- Excessive utility of cereals such as Hayānaka, Yavaka, Cīnaka, Uddālaka, Naiṣanda, Itkata, Mukundaka, Mahāvṛti, Pramodaka and Sugandhaka (CS.Ni.4.5²).

- Excessive utility of food prepared from Hareṇu obtained from recent harvest, Juice of Māṣa with Ghee, meats obtained from domestic animals, aquatic animals and animals of marshy lands, sāka, food prepared from gingelly and flour (Piṣṭaka), Diary products, Kuṣāra, Vilepi, food prepared from sugar cane, curd which is not prepared properly, liquids and sweets etc - (CS.Ni.4.5²).

- Absence from physical exercise and massages, excessive sleeping, long term sitting and others, which increase Meda and urine - (CS.Ni.4.5²).

These factors play a major role in the pathogenesis of Ikṣumēha and modern investigations also accept the sedentary life style as an aetiological factor of Diabetes Mellitus Type 2.

Aetiology of Pittaja Prameha
Aetiology of Pittaja Prameha includes;

- Excessive use of material, which possess the qualities such as Uṣṇa, Amla, Lavana, Kṣāra, Kālkuta and Tīkṣṇa,

- Use of inappropriately prepared food or food that are liable to inappropriate digestion; use of incompatible food, which cause the aggravation of pitta

- Excessive exposure to sunlight and heat, excessive exertion and anger - (CS.Ni.4.7²).

These aetiological factors may cause damages of the kidney directly or indirectly.
Aetiology of Vātaja Prameha

Aetiology of Vātaja Prameha includes;

- Excessive use of material, which possess the qualities such as kašaya karu, lika, rūkṣa, lāghu, śīla;

- Excessive indulgence of sexuality and exertion, excessive exposure to sunlight, uncontrolled feelings, sorrow, keeping awake at night, inappropriate postures of the body, refrains from natural urges and trauma; Excessive administration of Emesis, Purgation, Āsthāpana type of enema and Śirovirecana, fasting, and excessive bloodletting;

These factors will aggravate the Vāta - (CS.Ni.4.9) especially Vyāna and Apāna, causing Prameha and Śukrodoṣa- (SS.Ni.1.20).

Pathogenesis

The aetiological factors mentioned above lead to increase the body constituents such as Śeṣma, Pitta, Meda and Māṃsa, which will make the person fatty, weight gained and increase the viscosity of body - (CS.Su.17.38, CS.Su.23.2, SS.Ni.6.3). The vitiated doṣa produces diseases according to the places, where they deposit and the Prameha occurs due to the deposition of vitiated doṣa in Vasti - (SS.Su.21.33).

Pathogenesis of Śeṣmaja Prameha

Increased Śeṣma due to the influence of respective aetiological factors (Nidāna) will vitiate doṣa and affect the dūṣya (Tissues). The vitiated Śeṣma will disseminate throughout the body and amalgamate with Meda, Kleda and Māṃsa, which lead to generate gangrenes (Pūlimāṃsaja Piḍakā) such as Śarāvikā, Kacchipikā etc. The contaminated Kleda is converted into urine, which consists of the characteristics of vitiated Śeṣma. Vitiated Meda and Kleda affect the urinary system obstructing the channels. Śeṣmaja Prameha includes ten sub-types classified on the basis of characteristics of urine.

The characteristics, which are similar to those of Śeṣma, includes whiteness, coldness, hardness, viscousness, clearness, smoothness, heaviness, sweetness, ability to separate into two layers as condensed and clear and the unpleasant smell of urine - (CS.Ni.4.5). At the initial stage of the disease, doṣa will not be properly metabolized. The unmetabolized doṣa amalgamate with Meda - (SS.Ni.6.4) and propel into the channels carrying urine, which flow downward to excrete through the opening of Vasti (SS.Ni.6.4). Any type of Kapāhaja Prameha can arise at this stage.

Generally all the three doṣa, which involve in genesis of Prameha, affect the constituents such as Meda, Rakta, Śukra, Ambu, Vāsā, Lasikā, Majā, Rasa, Āpa, and Māṃsa of Vasti - (CS.Ci.6.6, CS.Ci.6.8). Dōṣa, which enters the vasti, contaminates urine and produces Prameha - (CS.Ci.6.4). Predominance of vitiated doṣa in Kapahaja Pramehas is Kapha and the mainly affected dusya is Meda. All sub-types of Kapahaja Prameha occur due to the amalgamation of vitiated Kapha, Vāta and Pitta with Meda - (Su.Ni.6.9).

Pathogenesis of Pittaja Prameha

This is the second stage of Prameha, where the paths are obstructed by Meda causing the impairment of proper functions of vāta, which increases the function of Agni (Tikṣṇāgni) and results in dryness of food and swift digestion - (CS.Su.21.5-7, CS.Ni.4.7). Pittaja Prameha occurs due to the amalgamation of vitiated Pitta, Vāta and Kapha with dūṣya such as blood - (SS.Ni.6.9, CS.Su.24.5) and Meda - (SS.Ni.6.9). Pittaja Prameha includes the six sub-types on the basis of characteristics of urine, which are similar to those of pitta such as alkalinity, acidity, salty, pungentness, usṇa, and smell of raw flesh (CS.Ni.4.7).

Pathogenesis of Vātaja Prameha

This is the tertiary stage of the Prameha. The person, who has excessive fat, will be broken down as fire burns forest, causing various types of complications - (CS.Su.21.5-7).
In comparison to Diabetes Mellitus, breakdown of fat occurs at this stage causing diabetic ketoacidosis. The vitiated vāta, disseminated throughout the body bringing the lymph into the channels of urine, produces Vasāmeha. When vāta brings Majā, Lasikā (Tissue fluids) and Ojā into urine, it produces Majjāmeha, Hastimeha and Madhumeha respectively (CS.Ni.4.91).

Hastimeha will excrete excessive volume of urine very slowly but it remains residual of urine in the bladder because of vitiated Vāta - (CS.Ni.4.91). Probably it may be due to the defects of neurogenic control on bladder.

Fatal conditions such as Jvara, Piḍakā and Bhagandarā occur in the case of excessive growth of fat due to the influence of vitiated vāta and Vātaja Prameha also arises - (CS.Su.21.5-71). Vātaja Prameha occurs due to the amalgamation of vitiated vāta, kapha and pitta with Vasā, Majā and Meda - (SS.Ni.6.91). The vitiated vāta also attracts Ojā and propels it into vasti, which causes Madhumeha, the final and the most serious stage, which is difficult to cure - (CS.Su.17.381). All types of Prameha lead to Madhumeha due to lack of management (SS.Ni.6.271).

In conclusion, Śesmaja, Pittaja, and Vātaja Prameha represent three clinical stages of renal damage. Śesmaja Prameha is the initial stage, where the function of kidney is impaired mildly. Pittaja Prameha, the second clinical stage of Prameha, shows moderately impaired renal functions and at the third stage, the Vātaja Prameha, renal functions are affected severely. In comparison, Diabetes Mellitus passes these three clinical stages during its clinical course. The stage of impaired glucose tolerance, which may show polyuria without sugars in urine, can be included in Udakameha. The stage of impaired glucose tolerance, which shows polyuria and glycosuria, are included in Ikṣumeha. The stage of impaired glucose tolerance, which shows polyuria, glycosuria and albuminuria are included in Sāndrameha and so forth.

Thus, the deficiency of insulin and insulin resistance are the two main causes of Ikṣumeha and Madhumeha, which is the terminal stage of renal diseases of any cause as well as the deficiency of insulin and insulin resistance.

References: