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Pathophysiological understanding of Medovaha Sroto Dushti in the current senerio

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Abstract

The presence of Dosha, Dhatu, and Mala together is described as Sharir in Ayurvedic scriptures. There are basically three: Trimala, Saptdhatu, and Tridosha. One of the Saptdhatu is Meda. Srotas is the internal transportation system utilised to transfer these Dhatus (Parinampradh). Numerous medical diseases in the body can be caused by the vitiation and depletion of Srotas. The Sthoulya Vyadhi or Prameha Poorvarooopa are two possible expressions of Medovaha Dushti, which results from a vitiated Medovaha Srotas. And nowadays, they are likened to obesity and diabetes, respectively. Obesity and diabetes epidemiology are on the rise and are seriously affecting both our present and future generations. The incidence of obesity is expected to increase by 40% during the following ten years, making it a global epidemic. This rising incidence has effects on the likelihood of developing diabetes, cardiovascular disorders, as well as chronic kidney disease (CKD) - A.K.J. Oxford. According to the International Diabetes Federation, in India there were around 72 million diabetics in 2017. (IDF). The usage of medical services and costs connected to obesity, diabetes, and other related disorders have increased significantly and are predicted to keep rising. The aforementioned information mandates that one understand the fundamentals of the Meda Dhatu and Medovaha Srotas. Therefore, the current study focuses on comprehending Meda Dhatu, Medovaha Srotas, as well as its Moola Sthana and potential diseases. Similar concept from the contemporary science have been analysed for a better understanding.

Keywords: Ayurveda, meda, medovaha srotas, sthoulya, prameha

1. Introduction

The essential elements of the human body, according to Ayurveda, are Tridosha (Vata, Pitta, and Kapha), Saptdhatu (Rasa, Rakta, Mamsa, Meda, Asthi, Majja, and Sukra), and Trimala (Sweda, Mutra and Purish) [1]. The Sanskrit root Du-Dhajya-Dharan Posanya, which means support and nutrition, is where the word "Dhatu" comes from. The fourth Saptdhatu, Medodhatu, is of greater clinical significance nowadays since it contributes significantly to the development of several metabolic illnesses, including Sthoulya and Prameha, among others.

Meda is mostly found in Udar, but when it appears in Anuasthi, it is known as Sarakta Meda, and in Sthoola Asthi, it is known as Majja [2]. The pure form of Meda that may be found in Mamsa is known as Vasa (Peshi). Thus, Meda Dhatu is the principal location of all lipids in the body. Medovaha Srotas, or the channels through which the Poshak Dhatu goes to produce the Sthayi Dhatu, are the transportation system for moving the Parinampradh Meda dhatu from the point of production to the site of action.

Normalcy at the Dosha, Agni, Dhatu, Mala, Prasanna Indriya, and Manaha levels is required to sustain the condition of health [3]. Both the body and the mind are affected when Vikruti is present in any of the Dhatus, whether it be Pramantaha or Guntaha. It is crucial to maintain Dhatu-level stability in order to maintain Swasthya (health). Since Meda Dhatu formation alone cannot perform any function without a proper circulatory system, i.e., Medovaha Srotas, both Meda and Medovaha Srotas were taken into consideration while using the term "Dhatu" in this context.

As a result, the Srotas' clearance and blockage correspond to various states of health and sickness. As a result, the significance of Srotas in maintaining health is rather clear [4]. The growth in the desire for fast food has led to an increase in the disruption in the Medodhatu and Medavaha Srotas, which is quite prevalent nowadays.

1.1 Aim and objectives

- To study the concept of *Meda Dhatu* and *Medovaha Srotas* through *Samhita Granths*.
- To study scientific corelation of *Medovaha Srotomoola* with that of contemporary science concept.
- To study classical concept of *Medoroga* and *Medovaha Sroto Dushti Lakshana* with that of modern allopathic science concept (contemporary science).

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2. Material and Methods

It is a conceptual study. The material is collected from the classical Ayurvedic texts, modern literature and various research papers etc.

3. Review of literature

3.1 Meda Dhatu

The word "Meda" comes from the root "Jihimida Snehana," which refers to a material with the Snigdhatva characteristic, such as Sneha, fat, or oil. Shabdkaalpdruma Medyati Snihatiti Meda Mamsagni and Updhatu work together to transform Mamsa Dhatu into Meda Dhatu [5]. Jala and Prithvi Mahabhoota have a relative prominence in its composition [6]. It is a Matraj Bhava derivative. When a medra is found inside a little bone, it is referred to as a sarkta medra, and when a medra is found inside a long bone, it is referred to as a majja. Two varieties of Medo Dhatu exist: Poshak (nourishing) and Poshya (which get nourishment). Poshak Medodhatu, the more mobile of the two, flows throughout the body with Rasa and Rakta Dhatu to feed Poshya Medodhatu. The *Poshya Medodhatu* which is immobile in nature is stored in *Medodhara Kala*. The site of *Medodhara Kala* is *Udar* and *Anuasthi* [7-8]. *Udar*, *Sphik*, *Sthan* are also depot of *Poshya Medadhatu*. *Meda dhatu* is the predominant *Dushya* in most of the *Santarpanjanya Vyadhi* like *Prameha* and *Sthaulya* [9]. The channels which give nutrition to the *Medo Dhatu* or the vessels carrying the nutritive material up to the site of *Medodhatu* can be considered as *Medovaha Srotas*.

3.2 Function of Medodhatu

- *Charaka Samhita - Asthi Pushti*
- *Sushruta Samhita - Sneha, Sweda, Dradhatva and Asthi Pushti*
- *Astanga Samgraha - Sneha, Sweda, Dradhatva, Asthi Pushti, Netra and Gatra Snigdhatva*
- *Bhavprakash - Sneha*
- *Astanga Hridaya - Sneha*

3.3 Srotas

Srotas is a representation of the body's internal transportation system. In both health and sickness conditions, it has been assigned a place of vital importance in Ayurveda. The Sanskrit word "sru sravane," which means to move, flow, penetrate, ooze, filter, exude, to secrete, or to leak, is the source of the word "srotas" according to etymology. Srotas is described by Acharya Charaka as the structure or channel via which Sravanam, or the oozing, movement, and penetration of various elements and nutrients, takes place [10]. Once again, it is characterised as circulating channels that carry Dhatus, which are continually undergoing metabolic modification (Parinamamap dyamananam) [11]. They serve as nutritional tissues' (Asthayi Dhatus') communication pathways, which are to be used for the development of permanent Dhatus (Sthayi Dhatus).

Srotas, according to Acharya Sushruta, are the body's channels that emerged from organ cavities, or Khadantarm, and are distributed throughout the body, with the exception of Sira and Dhamani [12].

Srotas were compared by Acharya Vagbhat to the very small pores and tubes seen in the lotus stem. "Rasa distributes throughout the body through very fine dwaras (pores) of Srotamsi," the author writes. These pores are widely dispersed throughout the body and resemble the tiny channels seen in the lotus stem [13].

According to Chakrapanidatta Srotas, the route that acts as both the point of entrance for and the vehicles for both Prasad and Mala Dhatus (or exit).

According to Dalhana, a commentator on the Sushruta Samhita, all the structures through which Prana, Anna, Udaka, Rasa, Rakta, Mansa, Meda, and other energies flow are referred to as Srotas.

Srotas are essentially the micro and macro channels of circulations and routes that carry out all of the physiological processes of the body, according to modern science. They transport a variety of substances into and out of the body, including solid, liquid, and gaseous ones, nerve impulses, nutrients, fluids, enzymes, hormones, waste products, etc.

The right construction and operation of these macro and micro channels determine whether the body is healthy or ill. The body remains free of ailments as long as these circulatory routes continue to work normally [14].

3.4 Swaropa (characteristics and qualities) of Srotas

The *Srotas* has the colour of the *Dhatu* (tissue) that they are carrying or transporting. They are of different shapes and sizes viz, round, thick, large, small, microscopic, elongated and form network and branches [15]. With this description, each and every cell can be considered as a *Srotas* since the transportation mechanism occurs within the cell and between cells.

3.5 Types of Srotas

3.5.1 Bahirmukha Srotas [16] – They are nine in male and twelve in female. *Netra* – 2, *Karna* – 2, *Nasa* – 1, *Mukha* – 1, *Guda* – 1, *Medhra* – 1. In female's *Yoni* – 1 and *Stana* – 2

3.5.2 Antarmukha Srotas

3.6 Srotas described in Charaka Samhita

- *Pranavaha Srotas*
- *Udakvaha Srotas*
- *Annavaaha Srotas*
- *Rasavaha Srotas*
- *Mamsavaha Srotas*
- *Asthivaha Srotas*
- *Majjavaha Srotas*
- *Shukravaha Srotas*
- *Mutravaha Srotas*
- *Swedavaha Srotas*
- *Purishavaha Srotas*

3.7 Srotas described in Sushruta Samhita

- *Pranavaha Srotas*
- *Udakvaha Srotas*
- *Annavaaha Srotas*
- *Rasavaha Srotas*
- *Mamsavaha Srotas*
- *Asthivaha Srotas*
- *Majjavaha Srotas*
- *Shukravaha Srotas*
- *Mutravaha Srotas*
- *Swedavaha Srotas*
- *Purishavaha Srotas*

3.8 Medovaha Srotas

- Through their various Srotas, Dhatu are fed. The Srotas known as Medovaha Srotas provide food for the Medodhatu. According to Dr. C. Dwarkanath, the Medovaha Srotas are the pathways through which nutrients are delivered to adipose tissue. The Medovaha

Srotas were regarded by Dr. Ghanekar B. G. as the omentum's and perinephric tissue's capillaries.

3.9 Concept of Moolasthanana

- The notion of Moolasthanana is emphasised in traditional Ayurvedic writings. Although they had varied views on Moolasthanana, they nevertheless regarded it as Prabhavasthanam, or the location from where all of that Srotas's operations were carried out and which was most negatively impacted by pathological circumstances. The commentator of Charaka Samhita Acharya Chakrapani interprets Moolamiti Prabhavasthanam as follows: "If the root of the tree is removed, it would hurt the whole tree." Similarly, if Srotomoola is harmed, the entire srota would suffer injury [16-17].

3.10 Moolasthanana

- The *Medovaha Srotomoola* means the organ which may be closely related to *Medodhatu* functions or which are important sites related to beginning or ending of the channels of *Medodhatu*.

Acharya	Moolasthanana
Acharya Charaka	Vrikka and Vapavahan
Acharya Sushruta	Vrikka and Kati
Acharya Vagbhat	Vrikka and Mamsa

3.11 Vrikka

One of the Koshtangas created by Medodhatu and Rakta's Sara [18]. According to Dalhana, a commentator on the Sushruta Samhita, Vrikka are two in number, located on the left and right sides of the quadrum, and resemble Mamsapinda in appearance [19]. He most likely implies retroperitoneal condition when he uses the word Parshva. According to Acharya Sharangadhara, Vrikka nurtures the Jatharpradesh Medodhatu [40].

The suprarenal gland, which regulates the release of both epinephrine and non-epinephrine hormones, actively contributes to the breakdown of triglycerides.

Lipids are not filtered by the kidney. Lipids are protected by the kidney, however because there is no filtration of fat and renal protection of lipids increases body fat. Protein and carbohydrates are filtered and digested, preventing this kind of effect. Lipids will be given specific consideration by the kidney. Increased blood urea would have prevented fat

accumulation if the kidneys did not filter urea. Accepting the claim made by Acharya Sharangadhara that it strengthens and builds fat deposition in the body, particularly the belly. The hormones produced by the adrenal cortex and medulla also have a role in lipid metabolism. Adrenal cortex-derived glucocorticoids affect sterol metabolism and adipose tissue production, which in turn affects fat metabolism [21].

3.12 Vapavahan

Koshtanga and Moolasthanana of Medovaha Srotas are mentioned. Vapa's carrier or transporter is referred to as vapavahan (fat). Where the most Meda is housed, according to Dr. Ghanekar and Acharya Chakrapani, is regarded to be the omentum.

A thin, fenestrated membrane with varied amounts of fat accumulation is how the omentum appears. Each individual's omentum is different in size. It is made up of two mesothelial sheets that mostly contain adipocytes that are embedded in loose connective tissue. Although this adipose tissue has a crucial immunological function, it may also be a cause of chronic inflammation in obese people, which could lead to metabolic syndrome [22].

3.12.1 Kati

Large amounts of fat are deposited in the Kati area. According to Taber's Cyclopedic medical Dictionary, it is associated with the loam region in modern times, whose precise side is the lower section of the back between the ribs and pelvis.

These days, the waist-to-height ratio (WHtR) is advised for detecting cardiometabolic syndrome. Studies on WHtR, WC, and BMI have been shown to be useful in predicting a variety of metabolic disorders, including obesity, diabetes, and others [23].

3.12.2 Mamsa

According to Mamsa Acharya Vagbhat, Mamsa is a moolasthanana of the Medovaha Srotas. Its physiological function may be the most likely explanation. It is well known that muscles, particularly skeletal muscles, may retain fat (IMCL- Intra myocellular Lipids).

3.13 Clinical Significance

3.13.1 Meda Dhatu Dushti Lakshana

Acharya	Medokshaya	Medovridhi
Charaka	Sandhi sphootan, Akshglani, Ayasa, Udartanutvam	Ninditani, Pramehapoorvaroopam
Sushruta	Pleehavridhi, Sandhi sunyata, Raukshya, Medurmamsa Prathana	Snigdhangata, Udarpashva Vridhi, Kasa, Swasa, Dourgandhyam
Ashtanga Hridaya	Katiswapa, Pleehavridhi, Krishangata	Tadvat, Alpacheshitite Sranam, Swasa, Sphik-Stana-Udar Lambanam
Ashtanga Samgraha	Pleehavridhi, Katiswapa, Sandhisunyata, Angaroukshaya, Karshya, Srama, Sosha, Medurmamsa Abhilasha, Mamsa Kshayokta Lakshan	Prameha Poorvaroopam, Sthoulya, Sleshma Mamsa, Rakta Vikara

3.13.2 Medovahsroto Dushti and Sroto Viddha Lakshana
Acharya Charaka has described Srotodushti Lakshana while

Acharya Sushruta has explained Srotoviddha Lakshana

Medovah srotodushti Lakshana	Medovah srotoviddha Lakshana
<i>Ashtanindita</i> <i>Pramehapoorva roopam</i>	<i>Swedagmana</i> (Excessive sweating) <i>Snigdhangata</i> (Oily skin/organs) <i>Talushosha</i> (Dry mouth) <i>Sthaulya</i> (Obesity) <i>Sopha</i> (Inflammation) <i>Pipasa</i> (Thirst)

Ashtanindita	Medoroga
Atidheerga (excessive tallness)	Medagranthi
Atiharshva (dwarfism)	Antravriddhi
Atiloma (excessive hairs)	Medovriddhi
Aloma (lack of body hairs)	Galaganda
Atikrishna (extreme dark colour)	Arbooda
Atigaur (extreme fair colour)	Prameha
Atisthula (obesity)	Sthaulya
Atikarshya (underweight)	Atisweda

According to Acharya Sushruta, a man will never understand the whole significance of something through the study of only one Shastra (science of medicine). A doctor should thus research all of the linked fields that are connected to this subject. Therefore, let's examine some contemporary literature in order to comprehend the Moolasthanana notion [24].

Swedagmana: Adrenal gland disorders may lead to an increase in the levels of epinephrine and norepinephrine produced by the adrenal medulla. These hormones cause excessive sweating by affecting the sympathetic nervous system.

Swasa: Obesity is linked to a number of respiratory issues. Obese people require more ventilation and struggle to breathe, have insufficient respiratory muscles, a smaller amount of functional reserve capacity and respiratory reserve volume, and their peripheral lung units close. A common cause of alveolar hypoventilation is obesity [25].

Taalū Soshā - When salivary flow rate is lower than the rate of water absorption from the mouth, the sensation of a dry mouth, including the palate, will arise. Both a cause and a symptom of elevated blood sugar is a dry mouth.

Pipasa - Pipasa may be caused by a drop in blood volume without a corresponding drop in intracellular fluid. Through the rennin-angiotensin system, kidney cells identify the reduced blood volume and cause thirst for both salt and water. Sōphā is the abnormal and excessive buildup of free fluid in the serous cavities and interstitial tissue space. The renin-angiotensin-aldosterone system secretes aldosterone, a hormone that retains salt, as part of the extra renal mechanism.

Generalized obesity and abdominal obesity are two separate phenotypes that are seen in each individual, according to Sthoulya. Because of this, abdominal obesity is a significant risk factor for the development of type 2 diabetes mellitus, coronary artery disease, insulin resistance, and many other concomitant disorders [26].

The World Health Organization (WHO) defines normal weight as a BMI between 18.5 and 25 kg/m², overweight as a BMI between 25 and 30 kg/m², and obesity as a BMI more than 30 kg/m². Waist circumference (WC) and a waist-hip ratio (WHR) of >102cm and 0.9, respectively, for males, and >88cm and >0.8, respectively, for women, are alternative measures to more precisely capture visceral fat. For the proper categorization of obesity in CKD, it has been demonstrated that WHR is preferable than BMI.

It has been predicted that the prevalence of obesity would increase by 40% over the next ten years, making it a global epidemic. The risk of diabetes, cardiovascular disease, and chronic kidney disease (CKD) - CKJ OXFORD are all affected by this rising prevalence. Obesity prevalence is rising, which has effects on both CKD and cardiovascular disease (CVD). One of the main risk factors for newly developing CKD is a high BMI [27].

In India, there were 72 million diabetics in 2017 (8.8% of the population over the age of 18), and 20% of urban residents (International Diabetes Federation) (IDF) [28].

The number of diabetics worldwide is expected to reach 80 million by 2025, making India the "Diabetes Capital" of the globe, according to the Diabetes Foundation of India [29]. Overeating has been identified as a significant risk factor for several illnesses, including diabetes, hypertension, heart disease, some types of cancer, etc [30]. Huffman *et al.* show that an increase in BMI has a statistically significant effect on diabetes among married women in Delhi, India, using a cohort sample of 1100 women in South Delhi [31]. The National Urban Diabetes Survey was used in the study by Ramachandran *et al.*, which discovered a link between diabetes and BMI for the urban population in six cities around India [32].

Discussion

When abnormal Meda is unnaturally deposited in the arterial wall and increases peripheral resistance (Dhamni prachaya/arteriosclerosis), it exhibits clinical manifestations like hypertension (HTN). In metabolic syndrome, abnormal Meda, when deposited into subcutaneous tissue, gives the clinical presentation of obesity, and similarly, when Abaddha Meda extracted to Basti creates the manifestation of the development of Meda is influenced by both excessive consumption and underutilization. People are more at ease thanks to contemporary lifestyles. Treatment plans for Medo Roga should be employed to control illnesses brought on by the vitiation of Medovaha Srotas [33]. It is necessary to complete Nidana Parivarjana, Samshaman, and Samsodhana Chikitsa. Guru Aptarpana should be used in the treatment of obesity. Additionally, it is stated that physical activity should be used as the primary method of using surplus energy when treating Prameha. Acharya Sushruta mentions that one of the finest treatments for Sthula Pramehi is to walk continuously for one hundred Yojana.

The same management standards that were outlined by our Acharyas hundreds of years ago are today supported scientifically by cutting-edge research that the rest of the world abides by. Here are just a few examples:

When compared to a conventional follow-up focused on education and support to maintain diabetes treatment, a lifestyle intervention involving calorie restriction and increased physical activity in overweight or obese diabetic patients lowered the risk for incident CKD by 30% [34].

Recent meta-analysis of experimental studies in obese CKD patients revealed that interventions to lower body weight consistently decreased blood pressure, glomerular hyperfiltration, and proteinuria [35].

Overall, our experimental results offer a proof of concept for the value of weight loss strategies in the management of CKD in obese individuals [36].

Prevention of the onset or postponement of the course of CKD, CVD, and DM, among other conditions, may be achieved by population-wide efforts to manage obesity. The whole healthcare sector must develop long-term plans to better understand the connections between obesity and associated disorders and to identify the most effective countermeasures.

The National Centre for Health Statistics initially raised the alarm in 1994 when it released information from the first three years of the National Health and Nutrition Examination Survey (NHANES). The prevalence of adult overweight grew from 55.9% to 64.5% from 1988-1994 (NHANES III) to NHANES 1999-2000, according to the authors. The prevalence of obesity rose from 22.9% to 30.5% throughout that time. The American Heart Association (AHA) issued a

call for action to prevent the repercussions of this pandemic in response to this unexpectedly abrupt rise in the incidence of obesity [37, 38]. The AHA has more recently discussed and examined a range of weight loss strategies for the management and treatment of obesity [39-41].

4. Conclusion

The evaluation of the Moolasthanas of the Medovaha Srotas and the scientific consideration of the Moola Sthana of the Medovaha Srotas, namely Vrikka, Vapavahan, Mamsa, and Kati, may be drawn as the accurate scientific explanation in light of the aforementioned facts. The two Vrikka are the Moola of Medovaha Srotas, which are situated in the posterior abdominal cavity, parallel to the spinal column, in the paranephric fat, in the Kostha, next to the kidney and the Prustavansh. Vapavahan and omentum are associated because Vapavahan is found in Udar, which is where extra Meda (triglycerides) is kept. The lumbar region is similar to the Kati, which is where triglyceride (Meda) is stored.

The intra-abdominal adipocyte's higher level of lipolytically active compared to those from other depots. Our acharyas have clear memories of this method. As a result, they regarded the intra-abdominal fat depots as the Moola Sthana of the Medovaha Srotas taking into account Vrikka, Vapavahan, Kati, and Mamsa. The notion of Sroto vitiation and management, which was described in our literature thousands of years ago, is now being scientifically validated by modern medical science via study and statistically calculated findings. An Ayurvedic physician must therefore have a thorough understanding of Srotas in order to treat a patient holistically and at the source of the problem.

5. References

- Sushruta Dalhana, Yadavji Trikamji Acharya, Editor. Sushruta Samhita with Nibandha Samgraha Commentary. Varanasi, Chaukhamba Orientalia. Eighth Edition; 2005. Sutrasthana 15/3.
- Agnivesha Charak Drudhabala, Yadavji Trikamji Acharya (ed). Charak Samhita with Ayurveda Dipika commentary. Varanasi: Chaukhamba Surbharati Prakashan. Reprint; Srotovimanadhyaya, c2000.
- Sushruta, Dalhana, Yadavji Trikamji Acharya, Editor. Sushruta Samhita with Nibandha Samgraha Commentary. Varanasi, Chaukhamba Orientalia. Eighth Edition; Sutrasthana 15/41. c2005.
- Agnivesha Charak Drudhabala, Yadavji Trikamji Acharya (ed). Charak Samhita with Ayurveda Dipika commentary. Varanasi: Chaukhamba Surbharati Prakashan. Reprint, 2000, 710.
- Sushruta Dalhana, Yadavji Trikamji Acharya, Editor. Sushruta Samhita with Nibandha Samgraha Commentary. Varanasi, Chaukhamba Orientalia. Eighth Edition; c2005 Sutrasthana 14/10.
- Agnivesha, Charak Drudhabala, Yadavji Trikamji Acharya (ed). Charak Samhita with Ayurveda Dipika commentary. Varanasi: Chaukhamba Surbharati Prakashan. Reprint, 2000, 254.
- Sushruta Dalhana, Yadavji Trikamji Acharya, Editor. Sushruta Samhita with Nibandha Samgraha Commentary. Varanasi, Chaukhamba Orientalia. Eighth Edition; c2005 Sharir Sthana 4/7.
- Sushruta Dalhana, Yadavji Trikamji Acharya, Editor. Sushruta Samhita with Nibandha Samgraha Commentary. Varanasi, Chaukhamba Orientalia. Eighth Edition; c2005; Sutrasthana 4/7.
- Agnivesha Charak Drudhabala, Yadavji Trikamji Acharya (ed). Charak Samhita with Ayurveda Dipika commentary. Varanasi: Chaukhamba Surbharati Prakashan. Reprint; c2000, 437.
- Agnivesha Charak Drudhabala, Yadavji Trikamji Acharya (ed). Charak Samhita with Ayurveda Dipika commentary. Varanasi: Chaukhamba Surbharati Prakashan. Reprint; c2000 Sutrasthana 30/12.
- Agnivesha Charak Drudhabala, Yadavji Trikamji Acharya (ed). Charak Samhita with Ayurveda Dipika commentary. Varanasi: Chaukhamba Surbharati Prakashan. Reprint; c2000 Vimanasthana 5.
- Sushruta Dalhana, Yadavji Trikamji Acharya, Editor. Sushruta Samhita with Nibandha Samgraha Commentary. Varanasi, Chaukhamba Orientalia. Eighth Edition; c2005 Sharir Sthana 9/13.
- Vagbhat KR, Srikanth Murthy (ed). Ashtanga Samgraha. Chaukhamba Sanskrit Series, Varanasi, Sharir Sthana 6/76, 2009, 10.
- Sushruta Dalhana, Yadavji Trikamji Acharya, Editor. Sushruta Samhita with Nibandha Samgraha Commentary. Varanasi, Chaukhamba Orientalia. Eighth Edition, 2005.
- Agnivesha, Charak Drudhabala, Yadavji Trikamji Acharya (ed). Charak Samhita with Ayurveda Dipika commentary. Varanasi: Chaukhamba Surbharati Prakashan. Reprint; c2000 Vimanasthana 5/25.
- Sushruta, Dalhana, Yadavji Trikamji Acharya, Editor. Sushruta Samhita with Nibandha Samgraha Commentary. Varanasi, Chaukhamba Orientalia. Eighth Edition; c2005 Sharir Sthana 5/10.
- Agnivesha Charak Drudhabala, Yadavji Trikamji Acharya (ed.). Charak Samhita with Ayurveda Dipika commentary. Varanasi: Chaukhamba Surbharati Prakashan. Reprint; c2000 Vimanasthana 5/9.
- Sushruta Dalhana, Yadavji Trikamji Acharya, Editor. Sushruta Samhita with Nibandha Samgraha Commentary. Varanasi, Chaukhamba Orientalia. Eighth Edition; c2005 Sharir Sthana 4/30.
- Sushruta, Dalhana, Yadavji Trikamji Acharya, Editor. Sushruta Samhita with Nibandha Samgraha Commentary. Varanasi, Chaukhamba Orientalia. Eighth Edition; c2005 Nidana Sthana 4/30.
- Dr. Aruna Kumari T, Dr. Anil Kumar G. A Study of thyroid dysfunction in chronic kidney disease Patients in a tertiary Care Hospital - A Prospective study. Int. J Adv. Biochem. Res. 2020;4(1):20-26. DOI: 10.33545/26174693.2020.v4.i1a.43
- Davidson S. edited by Christopher Haslett, Edwin R Chilvers, Nicholas A Boon, Nicki R College, International editor Jhon A, A Hunter, Edinburgh. Davidson's Principles and Practice of Medicine. Churchill Livingstone/Elsevier. 19th Ed (reprint 2004) chapter10.
- Ackermann PC, De Wet Pd, Loots GP. Microcirculation of the Rat Omentum study by means of Corrosion casts. Ach Anatomica. 1991;140(2):146-149.
- Lopez-Gonzalez D, Miranda-Lorao, Klunder-Lunder M, *et al.* Diagnostic performance of waist circumference measurements for predicting cardiometabolic risk in Mexican Children. Endocr Pract. 2016;22(10):1170-1176
- Sushruta. Sushruta Samhita: with Commentaries Nibandhasamgraha by Dalhana and Nyayachandrika by Gayadas. Chaukhamba Orientalis, Varanasi. 5th Ed. (reprint), Sutrasthana, 1992;4(7):17.

25. Young T, Patla M, Dempsey J, Skatrud J, Weber S, Badr S. The occurrence of sleep-disorder breathing among middle-aged adults. *N Engl J Med*. 1993;328:1230-1235
26. Davidson S edited by Christopher Haslett, Edwin R Chilvers, Nicholas A Boon, Nicki R College, International editor Jhon A, A Hunter, Edinburgh. Davidson's Principles and Practice of Medicine. Churchill Livingstone/Elsevier. 19th Ed (reprint). 2004;10:302.
27. Tsujimoto T, Sairenchi T, Iso H, *et al*. The dose-response relationship between body mass index and the risk of incident stage 3 chronic kidney disease in a general Japanese population: the Ibaraki prefectural health study (IPHS). *J Epidemiol*. 2014;24(6):444-451.
28. IDF. International Diabetes Federation, IDF SEA members; c2017a. Accessed December 2018, URL:<https://www.idf.org/our-network/regions-members/south-east-asia/members/94-india>
29. DFI. Diabetes Foundation (India), Accessed December 2018. URL: <http://www.diabetesfoundationindia.org/about.htm>
30. Huffman MD, Prabhakaran D, Osmond C, Caroline HDF, Fall CHD, Tandon N, *et al*. Incidence of Cardiovascular Risk Factors in an Indian Urban Cohort: Results from the New Delhi Birth Cohort. *Journal of American College of Cardiology*. 2011;57(17):1765-1774.
31. Colditz GA, Willett WC, Rotnitzky A, Manson JE. Weight Gain as a Risk Factor for Clinical Diabetes Mellitus in Women. *Annals of Internal Medicine*. 1995;122(7):481-6. <https://doi.org/10.7326/0003-4819-122-7-199504010-00001> PMID: 7872581
32. Ramachandran A, Snehalatha C, Kapur A, Vijay V, Mohan V, Das AK, *et al*. High Prevalence of Diabetes and Impaired Glucose Tolerance in India: National Urban Diabetes Survey. *Diabetologia*. 2001;44(9):1094-1101. <https://doi.org/10.1007/s001250100627> PMID: 11596662
33. Agnivesha Charak Drudhabala, Yadavji Trikamji Acharya (ed). Charak Samhita with Ayurveda Dipika commentary. Varanasi: Chaukhamba Surbharati Prakashan. Reprint 2000, Sutrasthana 28/26.
34. Wing RR, Bolin P, Brancati FL *et al*. Cardiovascular effects of intensive lifestyle intervention in type 2 diabetes. *N Engl J Med*. 2013;369:145-154.
35. Bolignano D, Zoccali C. Effects of weight loss on renal function in obese CKD patients: a systematic review. *Nephrol Dial Transplant*. 2013;28(Suppl 4):iv82-iv98
36. Ahmadi SF, Zahmatkesh G, Ahmadi E *et al*. Association of body mass index with clinical outcomes in non-dialysis dependent chronic kidney disease: A systematic review and meta-analysis. *Cardiorenal Med*. 2015;6(1):37-49.
37. Eckel RH. Obesity and heart disease: a statement for healthcare professionals from the Nutrition Committee, American Heart Association. *Circulation*. 1997;96(9):3248-3250.
38. Eckel RH, Krauss RM. American Heart Association call to action: obesity as a major risk factor for coronary heart disease. AHA Nutrition Committee, *Circulation*. 1998;97(21):2099-2100.
39. Klein S, Burke LE, Bray GA, Blair S, Allison DB, Pi-Sunyer X, Hong Y, Eckel RH. Clinical implications of obesity with specific focus on cardiovascular disease: a statement for professionals from the American Heart Association Council on Nutrition, Physical Activity, and Metabolism: endorsed by the American College of Cardiology Foundation. *Circulation*. 2004;110(18):2952-2967.
40. Sharangadhara. Sharangadhara Samhita commentary by Prayagadutta Sharma. Chaukhamba Amar Bharati Prakashan, Varanasi. Khanda-1,5/84.