



ISSN 2456-3110

Vol 6 · Issue 3

May-June 2021

Journal of
**Ayurveda and Integrated
Medical Sciences**

www.jaims.in

JAIMS

An International Journal for Researches in Ayurveda and Allied Sciences



Maharshi Charaka
Ayurveda

Indexed

Concept of *Santarpana* : A Scientific Analysis

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ABSTRACT

Human beings are the supreme creature in the universe they have the power to solve all problems including diseases. Acharya Charaka has explained in *Charaka Samhita* about the treatment protocol of the different type of life styles disorders considering to their pathogenesis. *Santarpana* is the one type of treatment procedures among all. If one does not maintain the proper protocol of *Santarpana Ahara* (dietetics) and *Vihara* (daily routine) then it vitiates *Kapha*, *Mamsa* and *Meda*, which cause various over nutritive disorders, which are popularly known as life style disorders. So, *Santarpana* acts as a *Hetu* (causative factors) and type of *Chikitsa* (treatment) depending upon the improper and proper use *Santarpana* is also responsible for maintaining the normal physiology of homeostatic process through energy balance by the intake of *Santarpana Ahara* and *Vihara*. Body weight is regulated through the energy balance, the amount of energy (ingested fuels as food) intake and the amount of energy expenditure (muscle action) over an extended period of time. In homeostatic conditions all ingested energies are normally metabolized to maintain basal metabolic rate, thermogenesis, and muscle action. Excess ingested energies are stored as fat in adipocyte for using later as per body need. To maintain basal metabolic rate (BMR) *Agni* (power of digestion and metabolism) plays an important role. Basically, *Santarpanaja Vyadhi* in terms of obesity is characterized by a dysregulation of the neuro-physical signals that controls the food intake, inducing an imbalance between energy expenditure and energy intake. A complex network of peripheral and hypothalamic signals helps to balance between food intake, nutritional partitioning or body weight, energy homeostasis and body's homeostasis. Leptin and ghrelin are two hormones that have a major influence on energy balance. Therefore, this review attempt to shed light on the role of *Santarpana* in terms of ghrelin and leptin to maintain the *Dhatusamya* (body's homeostasis) through regulation of the energy intake and expenditure along with BMR of human body and which will be helpful for scholars in treatment of diseases and advising precautions.

Key words: *Santarpana*, *Dhatusamya*, *Charak-Samhita*, *ghrelin*, *leptin*, *BMR*, *BMI*.

INTRODUCTION

Now a day's people are used to take hurry-burry life style due to changing circumstances, which is causing different types of lifestyle disorders. Qualities of life depend upon the respective guidelines mentioned in

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Submission Date: 21/05/2021 Accepted Date: 13/06/2021

Access this article online

Quick Response Code



Website: www.jaims.in

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Ayurveda Organization, Vijayapur,
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Charaka Samhita. To have the body weight in stable condition may balance in energy level must be maintained. Energy balance means energy intake has to be equal to energy expenditure. When the energy balance gets altered, eventually this may lead to body weight problem.^[1] Complex and distributed neural systems (hypothalamus and caudal brainstem) generally control food intake and energy expenditure in an individual which reflect fundamental biological importance of adequate nutrient supply and energy balance. We know that, apart from the above cortex, basal ganglia and limbic system are concerned with the procurement of food as basic and evolutionary conserved survival mechanism to defend lower limit of adiposity.^[2] Excess body mass index (BMI) gradually increases morbidity and mortality rate. Body weight is a complex system, regulated by both peripheral (gustatory system and the GI tract along with

pancreas, liver, muscle and adipose tissue) and central (caudal brainstem, hypothalamus and parts of cortex & limbic system) factors.^[3] To maintain the energy balance metabolic signals related to energy surplus will trigger several compensatory changes in cellular level. Leptin and ghrelin are two hormones that play an important role in the regulation of food intake and body weight. Both are produced from the periphery and send signal through different pathways to the hypothalamus. Leptin or ghrelin receptor initiates different signaling cascades for the activation which leads to changes in food intake.^[4] Luminal fat and protein are strong releaser of CCK (cholecystokinin), secreted from small intestine. This hormone also plays a major role in relation to food intake control.^[5]

Food intake is regulated by homeostatic and reward mechanisms and the adequate function of both is necessary for the proper maintenance of energy balance. Daily administration of ghrelin peripherally induces adiposity. BMI (body mass index and Plasma level of ghrelin are inversely correlated to each other. Ghrelin concentration in plasma level and mRNA level were raised by fasting and decreased by the feeding in the stomach. So, it is clear that ghrelin levels will change depending upon diet to maintain body weight. After gastrectomy plasma ghrelin level decrease, this is responsible for the weight-reducing effect.^[6]

The obvious behavioral changes are depending on an excess of energy include along with decreased food intake and increased physical activity in the form of 'exercise', may be form of spontaneous physical activity (SPA) or voluntary physical activity (VPA). SPA and subsequent non-exercise along with thermogenesis have linked to resistance to weight gain following forced caloric intake due to its largest degree of variability of all determinants of energy expenditure. VPA is essential for the maintenance of lowered body weight. Leptin, inhibit the food intake and stimulate the metabolic rate and maintain the energy balance through stimulation of physical activity.^[7]

The fruitful adaptation of wholesome diet and regimen in respect to calorie values are very much

essential to maintain the healthy state other-wise there is a massive chance of unhealthy condition due to intake of the unwholesome diet even if calorific value remains the same, which has already been described in *Santarpanaiya Adhyaya of Charak Samhita*. The *Santarpanaiya Adhyaya of Charak Samhita* can be discussed in three basic categories, popularly known as *Tri-Sutra*,^[8] i.e., *Hetu Sutra* (Description of Causes of health and diseases), *Linga Sutra* (Description of features of health and diseases) and *Aushadha Sutra* (Treatment for promotion of health and prevention or cure of diseases). The concept of *Santarpana* is being are discussed here.

CONCEPT OF SANTARPANA

Etymology of the term Santarpana

The word is derived from *sam√* trip or tripyati (*vachaspatyam/6.5211*)- means-to satiate or refresh, invigorate, gladden, delight, or to feed on one's self with.

Definition and Synonyms of Santarpana

According to Acharya Charaka, Dalhana, Ayurvediya Shabdakosa, *Santarpana* means to satisfy and to nourish the body. According to above meanings, it is clear that *Santarpanaja* drugs work at physical and mental level both. They are restorative in nature and refresh the mind through nourishing the Dhatus at cellular level. So, *Triptikaram*, *Prinanam* ^[9] & *Brimhana-hetuka* is *Brimhana* ^[10] which is responsible for the nourishment of the body. So, *Tarpanaa* and *Brimhana* are the synonyms of *Santarpana*.

Tarpanaiya ^[11] means to be satisfied.

Brimhana ^[12] means to make big, or fat or strong, increase or promote the quality of making fat or strong.

Types of Santarpana

Individuals get nourished or *Santarpana* in two ways i.e. *Sadyah Santarpana* (instant nourishment) and *Abhyasa Santarpana* (habitual intake of *Tarpanaiya* diet & regimen) which depends upon the need, physical constitution (*Prakriti*), power of digestion (*Agnibala*), therapeutics (*Bhaishajya*), dose (*Matra*)

and season & time (kala) of administration. *Sadya-Santarpana* therapy should be administered in case of fresh attack of emaciation (*Sadhyaksheena*), and *Abhyasa-Santarpana* (habitual intake of *Santarpanaiya* diet and regimen or drugs) should be administered in case of chronic type of emaciation.^[13] Regular intake of *Santarpanaiya* diet and regimen for maintaining the homeostatic condition also come under the *Abhyasa-Santarpana* group.

Santarpana as a Hetu Sutra (causative factors)

The causative factors of *Santarpanaja Vyadhis* described as per *Charaka Samhita*,^[14] *Ashtanga Hridaya*^[15] are as follows;

Aharaja Nidana	Charak Samhita	Astanga Hridaya	Mode of action
<i>Snigdha</i> (unctuous),	+	-	Alleviate <i>Vata & Pitta Dosh</i> aggravates <i>Kapha Dosh</i> ^[16]
<i>Madhur</i> (sweet),	+	-	Increase <i>Kapha Dosh</i> , which lead to <i>Vikriti</i> in body fluids ^[17]
<i>Guru</i> (heavy),	+	-	Helps in <i>Brimhana, Tarpana</i> , and <i>Vardhana</i> which leads to heaviness of the body ^[18]
<i>Picchila</i> (slimy substances),	+	-	It is <i>Abhishyandi</i> type of food, which causes <i>Mandagni</i> and leads to deposition of fat in the body. ^[19]
<i>Navanna</i> (newly harvested rice etc.),	+	-	It's <i>Abhishyandi Bhojana</i> , causative factor of <i>Madhumeha</i> , increase <i>Apa Mahabhuta</i> along with <i>Kapha</i> , ^[20]
<i>Navamadya</i> (fresh wine),	+	-	Its <i>Abhisandi</i> and <i>vitiates Kapha Dosh</i> ^[21] ,
<i>Gaudika</i> (dietary preparations made with jaggery)	+		Having the properties like <i>Vrisya, Guru, Pitta & Vata Shamaka</i> , increases <i>Meda & Kapha</i> . ^[22]

<i>Anup Matsya</i> and <i>Mamsa</i> (meat of marshy and aquatic animal),	+	+	<i>Kaphavardhaka, Picchila Gunatmaka</i> , and <i>Abhishyandi</i> in nature, due to excessive intake increase <i>Mamsa and Meda Dhatu</i> ^[23]
Cow's milks and its preparation, pastry such as <i>Paishtika, Ksheera, Sarpi</i> etc.	+	+	<i>Gorasa</i> having <i>Madhur Rasa</i> and <i>Vipaka</i> . It forms <i>Kleda</i> in body and increase <i>Kapha Dosh</i> , <i>Mamsa, Meda Dhatus</i> ^[24]
<i>Madhur Snigdha Basti</i>	-	+	Alleviates <i>Vata Dosh</i> but can increase <i>Kapha Dosh</i> if improperly used for longer period. ^[25]

Viharaja Nidan & Manashik Nidana	Charaka Samhita	Astanga Hridaya	Mode of action
<i>Asya-Sukha</i>	+	-	Responsible for the increase of <i>Kapha Dosh</i> in the body. ^[26]
<i>Shayya-Sukha</i>	+	+	Responsible for the increase of <i>Kapha Dosh</i> in the body.
<i>Swapna-Sukha</i>	+	+	Responsible for the increase of <i>Kapha Dosh</i> in the body ^[27]
<i>Chesta Dwesh</i>	+	-	Responsible for the increase of <i>Kapha Dosh</i> in the body ^[28]
<i>Divaswapna</i>	+	-	Day sleep is responsible for increase in the <i>Snigdha</i> property ^[29]
<i>Abhyanga</i>		+	Daily <i>Abhyanga</i> is <i>Pustikaraka</i> , but in <i>Kapha</i> aggravated state <i>Abhyanga</i> is contraindicated ^[30]
<i>Snan</i>		+	Regular <i>Snana</i> is responsible for

			maintenance of <i>Agni</i> , <i>Brimhana</i> , and <i>Vrisya</i> [31]
<i>Avyayam</i> (devoid of exercise)	+	+	May cause increase of <i>Kapha Dosha</i> , <i>Meda</i> and <i>Mamsa Dhatu vitiation</i> [32].
<i>Harsha Nitya or Achintana</i> (<i>Manashika nidana</i>)	+	-	It is <i>Kapha</i> aggravation factor, responsible for <i>Meda-Vridhdhi</i> . [33]

Santarpanaottha Vikara as a Linga (diseases due to Ati-Santarpana)

Name of the <i>Santarpanaottha Vyadhi</i> [34]	Co-relation in modern science
<i>Prameha</i>	Diabetes mellitus
<i>Peedaka</i>	Carbuncles
<i>Kotha</i>	Urticaria
<i>Kandu</i>	Pruritis
<i>Pandu</i>	Pallor, Anaemia
<i>Jwara</i>	Pyrexia
<i>Tandra</i>	Drowsiness
<i>Klaibya</i>	Sterility
<i>Atisthaulya</i>	Obesity
<i>Alasya</i>	Laziness
<i>Gurugatrata</i>	Heaviness of the body
<i>Indriyasrotasamlepa</i>	Adhesion of the channels in sensory organs delusion
<i>Moha</i>	Giddiness
<i>Pramilaka</i>	Wandering
<i>Sopha</i>	Edema
<i>Kustha</i>	Skin diseases including leprosy
<i>Arsha</i>	Piles

<i>Amapradosha</i>	Diseases due to indigestion
<i>Kamala</i>	Jaundice, Hepatocellular disorders
<i>Pleeharoga</i>	Splenic disorders
<i>Mutrakriccha</i>	Dysuria
<i>Arochaka</i>	Anorexia
<i>Hridroga</i>	Cardiac disorders
<i>Rajayakshma</i>	Tuberculosis
<i>Kasa</i>	Cough
<i>Swasa</i>	Dyspnea, Respiratory disorder
<i>Galaganda</i>	Thyroids disorders
<i>Krimi</i>	Helminthiasis, worm manifestation
<i>Grahani Dosha</i>	Irritable bowel syndrome
<i>Switra</i>	Vitiligo, leukoderma
<i>Agnimandya</i>	Reduced digestive power

Considering the above-mentioned diseases, it becomes clear that *Ati-Santarpana* causes vitiation in the *Kapha Dosha*, *Mamsa* and *Medo Dhatu* mainly which in turn causes different types of diseases depending upon specific pathogenesis.

Santarpana as an Aushadha

Santarpana is a *Chikitsa Upakram*, which is also known as *Brimhana*. [35] It is the best choice of treatment for emaciated and weak individuals. But *Santarpana* also responsible for maintaining the daily basis nutritional status of living beings. If one does not follow the proper protocol of *Santarpana* or *Brimhana* and given to improper person in improper way, then it leads to various disorders. *Dhatusamyakriya* [36] (either the maintenance of physiological and or psychological harmony in healthy state by preventive modulation or curative intervention in pathological state of body and mind), the aim and objective of *Ayurveda* is completely depended on six *basic*

*Padartha*³⁷ (*samanya, Vishesha, Guna, Dravya, Karma* and *Samavaya*) constituting the philosophical basement of science of life through doctrine of Causes and Effect. These *Samanya* and *Vishesha* principles have been elaborately given the shape of operational view of treatment principles in *Yojana Chatushka* of *Sutrasthan*. For examples different types of *Chikitsa Kram* depending on disease condition have been mentioned in *Santarpanaiya Adhyaya* of *Charaka Samhita*.

Qualities of Santarpana drugs^[38]

Drugs or diet having *Guru* (heavy), *Shita* (cold), *Mridu* (soft), *Snigdha* (unctuous), *Bahalam* (thick), *Sthula* (bulky), *Picchila* (*slimi*), *Manda* (sluggish), *Sthira* (stable) and *Slakshna* (smooth) attributes are responsible for the normal nourishment of the body. Actually, the attributes discussed here are of *Brimhana Dravyas* which are synonymous to *Santapana Dravya*.

Factors responsible for the Santarpana

Aharaparinamkarbhava^[39] (*Ushma* - digestive power, *Vata, Kleda* - moisture, *Sneha* - unctuousness, *Kala* - time of digestion & *Samyoga* - appropriate administration of food i.e., *Astaaharavidhivishayatana*^[40]) are responsible for the transformation (digestion - *Jatharagnipaka*, assimilation - *Bhutagnipaka* and metabolism - *Dhatwagnipaka* process regulate with the predominance of five proto elements of the respective *Dhatus*) of food. Where *Ushma* or *Pitta* takes part directly in digestion of food and the remaining factors take part indirectly. The process of transformation including assimilation of the food ingredients into the tissue elements of the body goes on in stages. Food provides nourishment to the tissue elements of the body which are homologous and not of contrary nature. Ingredients of the food having hardness nourishes the tissue elements of the body having hardness e.g., muscle tissue, bone etc. Similarly, liquid ingredients of food provide nourishment to the liquid tissue elements of the body viz. blood etc. If the properties of the food ingredients are contrary to those of the body, then there is emaciation of the body due to deficiency in

nourishment. Apart from the factors of foods transformation there are some instigating factors such as *Panchabhutagni* which regulate the proper *Poshana* or nourishment of *Paripakwadhatu* acts on specific receptors of respective *Dhatus* for absorption of protein, fat and carbohydrate. Basically, physiology of *Santarpana* follows the rules of *Samanya Vishesha Siddhanta*.

Relation between leptin, ghrelin, BMI and BMR

BMR is the metabolic rate at basal state or measures the rate of oxygen consumption under basal state. Basal state is physically and psychologically (but not Sleeping) undisturbed state in a thermally neutral environment (at an ambient temperature of about 25°C) after 12 to 14 hours of the last meal and free from any illness.^[41] It varies with age, sex, size, state of health of individual and is clearly correlated with body surface area to volume ratio. It is made so, because only then it gives almost constant value in one individual in repeated measurements. Basically, BMR is amount of energy per unit of time through which individuals has keeping the body functioning at rest. It affects those people who want to burn calorie to maintain, gain or losses weight. 60 to 75 % of the daily calorie expenditure is used for BMR by individuals.^[42] About 80-85% of the energy content of the average adult diet is provided by the carbohydrates & lipids, 15-20% by proteins (up to 5% may be provided by alcohol). Carbohydrates and lipids normally provide the energy actually used.^[43] So, BMR helps to compare the values in diseases and health and also in between individual but it is not affected by overweight. As per pets, BMR and RFMR (resting feed metabolic rate) increased proportionately if lean body mass and body surface area are increase. If individuals become overweight along with experience of increase body fat and decrease in the proportion of lean tissue to total body weight, energy expenditure of per unit body weight are decreased.

The proportion of energy derived from protein oxidation is inversely related to the body mass index (BMI) and percent of body fat which are derived from the diet. Leptin and Ghrelin both are endocrinal

regulators which are the responsible for the hunger and thirst. The appetite center is responsible for the sensation to seek of food. Sufficient food substrate has been received by individuals, at that time leptin level is high then, satiety center is stimulated and send impulses to inhibit the appetite or feeding center.^[44] Hypothalamus initiates the sense of hunger through receptor, when ghrelin level is high due to absence of insufficient food in stomach. Leptin released from adipose tissue as a function of energy store to circulate in proportion with the body fat mass, and comprises anorexigenic (causing anorexia-loss of appetite) signals that mediate the long-term regulation food intake, acting as a feed-back mechanism that target regulatory center in the CNS through hypothalamus to inhibit food intake and regulate body weight and energy homeostasis. Ghrelin hormone is mainly found in the stomach and duodenum. But it found also in Jejunum, lungs, pancreatic islet, gonad, adrenal cortex and placenta. It is also secreted from some region of CNS. Secretion of endogenous ghrelin is pulsatile and has direct relation with feeding behavior. It is responsible for growth hormone secreting receptor (GHSR) which is strongly responsible for the stimulation of appetite, food intake and body mass or body weight to regulate the complex process of energy homeostasis by adjusting hunger signals and energy outputs by maintaining the proportion of energy going to ATP producing, fat storage, glycogen storage and short term heat loss. Both hormones established a complex regulatory pathway, ghrelin seems to reverse the inhibitory stimulus led by leptin to increase the appetite stimulus, whereas leptin antagonizes the increase food intake by ghrelin. Through blood stream ghrelin hormones enter in to the CNS (mainly hypothalamus), through the stimulation of vagal nerve and nucleus tractus solitarius or locally produced in hypothalamus and affect the various hypothalamic tract. Leptin, after releasing from the adipose tissue send signals to the brain for giving information about the present status of energy stores in the body. Decrease in food intake and an increase in energy expenditure plays an important role to maintain the size of the body fat stores. Apart from the above role leptin has to

influence on various biological mechanisms including reproduction (initiation of human puberty), the immune and inflammatory response, hematopoiesis, angiogenesis, bone formation, and wound healing. Individuals who have higher BMI and high percent of body fat, leptin level becomes high of that individuals.^[45]

Relation between food intake and leptin & ghrelin^[46]

Food intake has significant role on the level of plasma leptin and ghrelin. Ghrelin is the major contributing factors to reward-driven feeding that can over-ride the state of satiation. Reward is a stimulus which serves to reinforce a desired response. It may be single psychological process or unitary feature of a reinforcing stimulus. Foods contain with rich sugars and fat are strong or potent rewards and promote eating. Several neurotransmitters and neuropeptide are engaged in homeostatic regulation of food intake. Due to overfeeding, increases level of leptin expression in adipocyte and circulating leptin in healthy human. Intake of Low-protein diet agreed with high level of ghrelin secretion and reduced with high-fat diet related to high carbohydrate meals. Carbohydrate seems to be most efficient macronutrient for ghrelin suppression (fast moving of carbohydrate from stomach), because of its fast absorption & metabolism along with insulin-secreting effects. Proteins initiate the prolonged suppression of ghrelin due to the prolonged emptying of proteins from stomach. Ingested protein enriched diets have the effect to increase circulating concentrations of amino acids, stimulate hepatic gluconeogenesis and stimulates the secretion of specific gastrointestinal peptides (CCK, GLP-1, GLP) that delayed gastric emptying and promoting satiety. Ingestion of fat rich diets exhibits rather weak & insufficient ghrelin-suppressing capacity which may elucidate the reduced satiety & increased weight gain. Leptin secretion is proportional to the total amount of adipose tissue. Serum ghrelin secretion decreased with sugar intake.

Diet and exercise have a significant effect to maintain energy homeostasis and body weight or BMI. The best strategy is to use potential anti-obesity medicaments

in combination with a low-fat diet and proper exercise to achieve long-term changes in body weight.

DISCUSSION

To sustain life and obtain growth and sufficient energy, food intake is powerful biological need. Inhibitory effect of dietary consumption on appetite is known as satiety. It is a dispositional state of the individual & function is to avoid overfeeding.^[47] In a word, satiety is defined as a state of noneating, characterized by the absence of hunger, which follows the end of meal and arises from the consequences of food ingestion (encyclopedia of food and health, 2016). On the other hand, *Ati-Santarpana* stands for the unutilized high calorie value engulfed by the means of high calorie diet due to maintaining of sedentary life style without any exercise even after satisfying the satiety center.

Santarpana acts as *Nidana* or *Hetu* and *Chikitsa Upkram* depending upon the improper and proper use. It is also responsible to maintain basic physiology of nourishment. The word *Santarpana* also implies for the unutilized high calorie value engulfed by the means of high calorie diet due to maintaining of sedentary life style without any exercise even after satisfying the satiety center. So, *Santarpana* result the deposition of fat as adipocyte due to leptin resistance. When, excessive *Santarpana* is done, then it leads first *Medoroga* or obesity after that different *Santarpanaja Vyadhi* takes places as per Ayurveda.

Individuals expresses desire for food, when feel hungry and thirsty. Leptin and ghrelin both are hormone which are responsible for hunger and thirst. Sufficient food substrate has been received by individuals, at that time leptin level is high, then satiety center is stimulated and send impulses to inhibit the feeding center. Hypothalamus initiates the sense of hunger through receptor, when ghrelin level is high due to absence of insufficient food in stomach. So, leptin and ghrelin plays an important role to regulate the consumption of food in daily basis through which body gets *Tarpanaa* or *Santarpana* or *Brimhana* or nourishment and maintain the energy balance.

Santarpana is of two types *Abhyasa-Santarpana* and *Sadyah-Santarpana*. Some factors which are responsible to regulate the *Abhyasat Santarpana* i.e. the physical constitution (*Prakriti*), power of digestion (*Agnibala*), therapeutics (*Bhaisajya*), dose (*Matra*) and season & time (kala) of administration. The physiological factors that influence the leptin secretion i.e., gender, age, adiposity, physical exercise, feeding and caloric restriction. More hours of sleep responsible for the lower ghrelin level.

Intake of food have significant role on the level of circulating leptin and ghrelin. Due to overfeeding, raises level of leptin expression in adipocyte and circulation of leptin in healthy human. Protein is the most important satiating macronutrients for maintaining the health. Considering different research, it was revealed that high-protein or low - carbohydrate diets have more effective to reduce weight in both adults and children other than low-fat diets. Intake of Low-protein diet agreed with high level of ghrelin secretion and reduced with high-fat diet related to high carbohydrate meals. Serum ghrelin secretion decreased with sugar intake.^[48] Carbohydrate seems to be most efficient macronutrient for ghrelin suppression (fast moving of carbohydrate from stomach), because of its fast absorption & metabolism along with insulin-secreting effects. Proteins initiate the prolonged suppression of ghrelin due to the prolonged emptying of proteins from stomach. Ingested protein enriched diets have the effect to increase circulating concentrations of amino acids, stimulate hepatic gluconeogenesis and stimulates the secretion of specific gastrointestinal peptides (CCK, GLP-1, GLP) that delayed gastric emptying and promoting satiety. Ingestion of fat rich diets exhibits rather weak & insufficient ghrelin-suppressing capacity which may elucidate the reduced satiety & increased weight gain.^[49] Post-prandial leptin level became higher due to ingestion of carbohydrates meal than an isoenergetic fat meal. Some foods which helps to work leptin more effectively such as- berries (presence of low sugar), healthy oil (olive oil, flax seed oil), vegetables (raw or roasted with oil), protein contain diets such as

legumes (beans, peas and lentil), lean meat, poultry and fish, whole grains, salad (dressing with salt and sugar), mushroom etc. (protein provide satiety by slowing the process of gastric empty and improving leptin sensitivity) which have the *Guru* (heavy), *Shita* (cold), *Mridu* (soft), *Snigdha* (unctuous), *Bahalam* (thick), *Sthula* (bulky), *Picchila* (slimi), *Manda* (sluggish), *Sthira* (stable) and *Slakshna* (smooth) quality.

CONCLUSION

According to the above discussion it can be concluded that, leptin and ghrelin are two hormones that have a major influence on energy balance through regulating the energy consumption and energy expenditure. This review attempt to create a reflection about the role of *Santarpana* in terms of ghrelin and leptin to maintain the *Dhatusamyā* (body's homeostasis) through regulation of the energy intake and expenditure along with BMR of human body which will be helpful for scholars in treatment of diseases and advising precautions.

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How to cite this article: Afroja Yeasmin Akhtar Roji, Murlidhar Paliwal. Concept of Santarpana : A Scientific Analysis. J Ayurveda Integ Med Sci 2021;3:84-93.

Source of Support: Nil, **Conflict of Interest:** None declared.
