PHYSIOLOGI CAL CONCEPTS

ĀRYAVAIDYAN, Vol. 38, No. 1, August - October 2024, Pages 14 - 21

A Comprehensive Analysis of Garbhini *Lakshanas* - From the Perspective of Physiological and Endocrinological Changes

Devika Srinivasan*[1], Rachana H.V.[2]

Received: 28.06.2024 Revised: 19.09.2024 Accepted: 15.11.2024

ABSTRACT: In earlier periods, when there was no way to diagnose pregnancy, our *Aacaaryas* depended on certain indicators which are seen during pregnancy termed as *garbhini lakshanas*. Some set of *lakshanas* are seen immediately after the conception i.e., *sadyograheeta garbha lakshanas* whereas another set of symptoms are seen during the later stage of pregnancy i.e., *vyakta garbha lakshanas*. Apart from this the month wise signs and symptoms seen in the pregnant woman as the foetus grows, are documented from 4th month onwards. If we try to analyse these signs and symptoms in detail, we can correlate these *lakshanas* with the physiological and hormonal changes during pregnancy. Understanding *garbhini lakshanas* potentially offers a new perspective on diagnosis and management of complications during pregnancy

Keywords: Sadyograhita garbhalakshanaas, Vyakta garbhalakshanaas, Maasaanumaasika garbhinilakshanaas, Endicrinology, Maternal adaptations, Physiology in pregnancy

INTRODUCTION

During pregnancy there are progressive anatomical, physiological and biochemical changes not only confined to the genital organs but also to all the systems of the body. This is principally a phenomenon of maternal adaptation to the increasing demands of the growing fetus.[1] Understanding these adaptations is crucial for ensuring both maternal and foetal health throughout the pregnancy.

The hormonal and non hormonal changes that occur during pregnancy and parturition are regulated through a physiological mechanism referred to as the feto-placen-tal unit. A series of hormones and transmitters are pro-duced by each of the components of this unit, and they have multiple effects within and between the foetus, the placenta and the mother.[2] These adaptations include cardiovascular changes like increased blood volume and cardiac output, respiratory adjustments to meet the higher oxygen demands, renal adaptations to manage increased metabolic waste, haematological changes such as haemodilution and various other changes.

Endocrinology also plays a pivotal role in orchestrating these physiological changes. The concept of the foetus, the placenta and the mother as a functional unit originated in the 1950s. More recent is the recognition that the placenta itself is an endocrine organ capable of synthesizing virtually every hormone, growth factor, and cytokine thus far identified.[3] Pregnancy is regulated by a complex interplay of hormones, including human chorionic gonadotropin (hCG), progesterone, oestrogen, relaxin and prolactin. These hormones are responsible for maintaining the uterine environment, preparing the body for labour, and ensuring proper foetal development.

The symptoms experienced during pregnancy known as '*garbhinee lakshanas*' such as *chardi* (nausea), *glaani* (fatigue), *arocaka* (changes in

1. *PG Scholar, Corresponding mail: devika9797@gmail.com*
2. *Professor, Dept. Prasutitantra and Striroga, Sri Sri College of Ayurvedic Science and Research, B3911, Brigade Meadows, Saaluhunase Village, Kanakapura Road, Bengaluru 560082.*

appetite) etc. are largely driven by these hormonal fluctuations and physiological adjustments.

Although our *Aacaaryas* do not explicitly refer physiological changes like haemodilution of hormones, a striking correlation can be revealed between the symptoms described and the changes identified by modern science. Exploring these correlations not only enriches our comprehension of pregnancy but also underscores the timeless relevance of ancient medical traditions in informing and complementing modern healthcare practices. In ayurvedic classics, *garbhinee lakshanas* are mentioned under the following contexts:

1) Sadyogrheeta Garbha Lakshanas
2) Vyakta Garbha Lakshanas
3) *Masaanumaasika Garbhini Lakshanas*

These *lakshanas* mentioned as per different *Aacaaryas* are categorized and analysed critically to establish a relationship with endocrinological and physiological changes during pregnancy.

Sadyogrheeta Garbha Lakshana

Sadyo- Immediately; *Grheeta*- conception

The signs and symptoms which are seen immediately after the conception are called *sadyogrheeta Garbha Lakshana*.[4]

Table 1
Sadyogrheeta Garbha Lakshana

Lakshana	Caraka Samhita [5]	Susruta Samhita [6]	Ashtaanga Sangraha[7]
Nishteevika	+	-	+
Gourava	+	-	+
Angasaada	+	-	+
Tandraa	+	-	+
Praharsha	+	-	+
Hrdaya Vyathaa	+	-	+
Trpti	+	-	+
Beeja Grahanam ca Yonyaam	+	-	+
Shrama	-	+	-
Glaani	-	+	+
Pipaasaa	-	+	+
Sakthi-sadana	-	+	-
Sukra Sonitayoravabandha	-	+	+
Sphuranam ca Yoni	-	+	+
Hrllaasa	-	-	+
Praseka	-	-	+

Vyakta Garbha Lakshana

The signs and symptoms which are expressed in due course of the pregnancy after the manifestation of *Sadyogrheeta Garbha Lakshanas*, i.e., *uttarakaaleena Grheeta Garbha Lakshanas* are termed as *Vyakta Garbha Lakshanas*.[8] *Aacaarya Caraka* mentions that *Vyakta Garbha Lakshana* starts from third month onwards with *douhrda* as a main feature.[9]

Table 2 Vyakta Garbha Lakshana			
Lakshana	**Caraka Samhita** [10]	**Susruta Samhita** [11]	**Ashtaanga Sangraha**[12]
Aartava-Adarsanam	+	-	-
Aasya Samsraavanam	+	-	-
Anannaabhilaasha	+	-	-
Chardi, Akamatah Chardi	+	+	+
Arocaka	+	-	+
Amla- kaamata	+	-	+
Sraddha Pranayanam Uccaavaceshu Bhaaveshu	+	-	+
Guru-gaatratvam	+	-	-
Cakshugglaani	+	-	-
Stanayoh Stanyam	+	-	-
Stanoshthayoh Stanamandalayoh Kaarshnyam	+	+	-
Paadayoh Svayathu	+	-	+
Roma Raaji Udgamah	+	+	-
Yonyaah ca Ataalatvam	+	-	-
Akshi pakshmaani Sammeelyante	-	+	-
Subhaat Gandhaat udvijaate	-	+	-
Praseka	-	+	-
Sadanam	-	+	-
Kukshimaatra gauravam	-	-	+
Kshaama Netra	-	-	+
Kshaamaswara	-	-	+
Akshiroma Samlulana	-	-	+
Nidraa	-	-	+
Jrmbhanam	-	-	+
Moorccha	-	-	+

Maasaanumaasika Garbhini Lakshana

Along with the monthly development of the fetus during pregnancy, Aacaaryas have also recorded the corresponding symptoms experienced by the mother.

Table 3 *Maasaanumaasika Garbhini Lakshana*			
Month	Lakshana	Caraka [13]	Kasyapa [14]
4th month	*Guru Gaatratva*	+	+
5th month	*Kaarsyam*	+	+
6th month	*Balavarna-haaani*	+	-
	Srama	-	+
7th month	*Klaantataa*	+	+

DISCUSSION

One of the fundamental concepts in *ayurveda* is '*kaarya kaarana vaada'* also known as the *sat-kaarya vaada'*.According to this theory, every action must have a cause, and without a cause, there can be no effect. This doctrine of cause and effect can be applied to explain the relationship between the signs and symptoms of pregnancy (i.e., *Kaarya = Garbhini Lakshana*) and the physiological changes occurring during pregnancy (i.e., *Kaarana*). Understanding the factors and mechanisms responsible for the physiological changes during pregnancy is crucial for effective evaluation and management of any pathological states or complications that may arise.

Critical Analysis of *Sadyogrheeta Garbha Lakshanas*:

Nishteevika, Praseka **(Excessive Salivation)**- Women during pregnancy are occasionally

distressed by profuse salivation (ptyalism). Although usually unexplained, ptyalism sometimes appears to follow salivary gland stimulation by the ingestion of starch. It commonly occurs with hyperemesis gravidarum.[15] â-hCG and oestrogen may be the hormones implicated in the pathogenesis of ptyalism as the symptom ceases with delivery.[16]

Pipaasaa (Thirst)- The osmotic thresholds for thirst and antidiuretic hormone release each decrease approximately 10 mosmol/kg during the initial weeks of human gestation. Lowered thirst threshold stimulates increased water intake and dilution of body fluids.[17] These changes are vital for supporting the increased blood volume and ensuring a stable environment for the developing foetus.

***Hrllaasa* (Nausea), *Hrdaya-vyatha* (Palpitation/ discomfort in the chest region)-** Progesterone has an inhibitory effect on the smooth muscle of the pylorus and small bowel, decreasing gastrointestinal motility and delaying gastric emptying resulting gastro oesophageal reflux and heart burn.[18]

***Gourava* (Heaviness), *Angasaada* (Malaise), *Tandraa* (Sleepiness), *Shrama* (Fatigue), *Glaani* (Languor), *Sakthi-sadana* (Lassitude of thighs)**- Early pregnancy fatigue- Fatigue may be due to increased progesterone levels. Progesterone is known to be a natural sedative.[19] Also increased Basal Metabolic Rate and oxygen consumption to adapt to the metabolic shifts due to pregnancy are also contributary to fatigue.

***Praharsha* (Horripilation)**- Pilomotor reflex- a physiological response characterized by the contraction of small muscles attached to hair follicles. While the precise mechanism is yet to be elucidated, oestrogen has been implicated in altering the sensitivity of the sympathetic nervous system and progesterone's relaxing effects on smooth muscles may indirectly influence pilomotor muscle responsiveness. [20],[21]

***Trpti* (Contentment)**- An array of hormones plays a crucial role in maintaining emotional well-being during pregnancy. Oestrogen enhances the synthesis and function of neurotransmitters such as serotonin, which contributes to mood stabilization.[22] Progesterone exhibits anxiolytic properties due to its action on GABA receptors, promoting relaxation.[23] Additionally, oxytocin reduces stress levels and cortisol, while the body's natural painkillers, endorphins, induce feelings of euphoria, contributing to overall contentment and happiness.[24],[25]

***Sukrasonitayoravabandha/ Beeja grahanam ca Yonyaam* (Union and retention of the gametes)-** Progesterone and oestrogen stimulate uterine growth and induce the decidual changes in the endometrium necessary for implantation. Additionally, progesterone, along with hCG and decidual cortisol, plays an immunomodulatory role by inhibiting T-lymphocyte-mediated tissue rejection, thereby protecting the conceptus.[26]

***Sphuranam ca Yonyaam* (Quivering of Vagina)**- 'Osiander Sign' is one of the early indicators of pregnancy characterized by a palpable pulsation felt through the lateral fornices as early as the 8th week of pregnancy.[27] The increased blood flow to the uterus and cervix during pregnancy driven by elevated levels of oestrogen and progesterone, leads to increased vascularity and development of new blood vessels. This enhanced vascularity results in more pronounced arterial pulsations.

Critical Analysis of *Vyakta Garbha Lakshanas*:

***Aartava adarsanam* (Physiological Amenorrhoea)**- Luteinizing Hormone (LH) drives progesterone production and secretion from the corpus luteum and once pregnancy occurs, hCG takes over this function (Luteo-placental Shift).[28] The continuous high levels of oestrogen and progesterone inhibit the hypothalamic-pituitary-ovarian axis pausing the ovarian cycle,

preventing further secretion of GnRH, LH and FSH followed by the cessation of menstruation.

***Aasya samsraavanam* (Excessive Salivation), *Anannaabhilaasha* (Disinterest in food), *Chardi/Akamatah Chardi* (Vomiting), *Arocaka* (Anorexia), *Aruci* (Anorexia), *Praseka*(Excessive Salivation)-** Elevated levels of oestrogen, progesterone and human chorionic gonadotropin (hCG) combine to bring about nausea and vomiting, commonly termed as 'morning sickness.' Morning sickness develops in over 70% of pregnancies and can occur at any time of day. Elevated progesterone levels induce smooth muscle relaxation, leading to prolonged gastric emptying time. When combined with decreased gastroesophageal sphincter tone and upwards displacement of the stomach, reflux often occurs. Progesterone-mediated smooth muscle relaxation also leads to decreased motility in the large bowel, resulting in increased water absorption and constipation. [29]

***Amlakaamata* (craving for sour substances), *Sraddha pranayanam ucchaavaceshu bhaaveshu* (Extreme cravings in food), *Subhaat Gandhaat udvijate* (Aversion to pleasant smell)**- Pregnancy significantly alters sensory perception, possibly due to changes in secretion of hormones. Altered taste sensitivity and changes in olfactory perception have been reported during pregnancy. Craving could also be a response to nutritional deficits. For example vitamin C is found in many sour foods.[30]

***Stanayoh stanyam* (Colostrum secretion in breast)-** During the first trimester, the ductal system expands and branches out into the adipose tissue in response to the increase of oestrogen. Elevated levels of oestrogen also cause a decrease in adipose tissue and ductal proliferation and elongation. Oestrogen also stimulates the pituitary gland which leads to elevated levels of prolactin. By the twentieth week of gestation, mammary glands are sufficiently developed to produce components of milk due to prolactin stimulation. Milk production is inhibited by high oestrogen and progesterone levels and colostrum is produced during this time. In the third trimester and then rapidly after birth, these levels decrease, allowing for milk production. [31]

***Stanoshthayoh Stanamandalayoh kaarshnyam atyartham*(Darkening of nipple and areola in the breast), *Romaraaji udgamah* (Linea nigra)-** Skin hyperpigmentation is common during pregnancy and often is due to endocrinological changes, specifically the increasing levels of the melanocyte-stimulating hormone (MSH). The usual pattern will be seen as Linea nigra, melasma and darkening of areola, axillae, and medial thighs.[32]

***Paadayoh Svayathu* (Pedal Oedema)**- Approximately 70% of women present with clinical oedema at some point during pregnancy. One of the common causes of lower extremity oedema during pregnancy is an increase in hydrostatic pressure. As a normal physiologic change in pregnancy, total body water increases by 6 to 8 Liters. Two-thirds of this fluid is extracellular, and one-third is stored interstitially.[33]

***Yonyaah ca Ataalatvam* (*Vivrtam*)-** Vaginal walls become hypertrophied, oedematous and the length of the anterior vaginal wall is increased.[34] Elevated levels of oestrogen and progesterone, influence the production of collagen and elastin in the vaginal walls. Additionally, the expanding uterus during pregnancy exerts pressure on surrounding pelvic structures, including the vagina, gradually stretching and widening the vaginal canal.[35]

***Akshipakshmaani sammeelyante* (Blinking of eyelids), *Akshi-roma Samloolana* (Quivering of eyelashes)**- Excessive blinking or twitching of the eyes may be associated with fatigue or due to hormonal fluctuations during pregnancy which affect various systems including the nervous system.[36]

***Sadanam* (Tiredness), *Kukshi maatra-gauravam* (Heaviness of abdomen), *Kshaama Netra* (Weakness of eyes), *Kshaama Swara* (Weakness of voice), *Nidraa* (Sleepiness), *Jrmbhanam* (Yawning), *Guru-gaatratvam* (Heaviness in body), *Cakshugglaani* (Languor in eyes)-** These symptoms align with pregnancy fatigue attributed to increased progesterone which has been described under *Sadyogrhita Garbha Lakshanas* as well.

***Moorcha* (Fainting)-** Hemodynamic shifts during pregnancy including increase in blood volume and cardiac output, along with hormonal effects on the vasculature, can contribute to a heightened risk of syncope causing dizziness and fainting.[37]

Critical Analysis of Maasaanumaasika Lakshanas:

4th month- Kashyapa states *guru-gatratvam* (heaviness of body) in the *garbhini*. *Aacaarya* Charaka has added that the *garbhini* attains stability of foetus because of which she feels more *gurutva*. The growing foetus places added stress on postural muscles as the centre of gravity shifts forward and upward, and the spine shifts to compensate and maintain stability. [38]

5th month- Kashyapa mentions *kaarsyam* (emaciation). As per *Aacaarya* Charaka, there is '*maamsa-sonitopacayo bhavati adhikam...*' to which Chakrapani Datta has commented that the mother's nutrition is utilized for *garbhaposhana*(nutrition for the foetus), hence *karsyatva* occurs in the mother.[39] The mother's body may begin to use its own stores of fat and muscle to meet the nutritional needs of the foetus, leading to maternal weight loss and muscle wasting.[40]

6th month- Kashyapa elucidates that there is *sramaadhikya* (exhaustion) in the *garbhini*. According to *Aacaarya Charaka*, *bala-varna haaani (loss of strength and complexion)* occurs in the mother as there is *balavarna upacaya* in the foetus along with *dhaatu pushti*.[41]

7th month- Kashyapa specifies *nityaklaanta,* whereas *Charaka* also similarly opines that there is *sarvaakaraih klantatama.* This is because of the overall development of the *garbha* in terms of all the components, especially *maamsa* and *sonita*.[42]

CONCLUSION

Pregnancy is a complex biological process characterized by dynamic changes in the body, orchestrated by intricate hormonal interactions and physiological adaptations. The exploration of signs and symptoms of pregnancy and their correlation with physiological and neuro-endocrinological events is crucial for advancing both diagnosis and management strategies in maternal healthcare. It is remarkable to note that ayurvedic texts, dating back centuries, have delineated the signs of pregnancy with remarkable accuracy, long before the advancements of modern medical science. Despite the vast differences in methodologies and terminology, the principles outlined by ancient ayurvedic scholars remain relevant and applicable even today.

REFERENCES

1. Konar H. *DC Dutta's textbook of obstetrics*. 8th Edition, p-52, JP Medical Ltd; New Delhi: 2015
2. Hacker NF, Gambone JC, Hobel CJ. *Hacker & Moore's essentials of obstetrics and gynaecology.* 6th Edition,p-52 Elsevier Health Sciences
3. Creasy RK, Resnik R, Iams JD, Lockwood CJ, Moore T, Greene MF. *Creasy and Resnik's Maternal-Fetal Medicine: Principles and Practice*. 6th Edition, p-111, Elsevier Health Sciences; 2009
4. Acharya JT, Acharya NR, *Nibandhasangraha by Dalhanacharya and Nyayachandrikapanjika by Gayadasa Acharya on Susruta Samhita, Saareerasthana*.Ch.3, Ver.13, p-352. Krishnadas Academy; Varanasi: 1998.
5. Acharya J T. Agnivesha, Charaka Samhita of Acharya Charaka, Chakrapaniduttakrta, Saareerasthana, Ch.2, Ver.23, p-304 Chaukhambha Surbharrati Prakashan, Varanasi 2009

6. Sharma PV. *Susrutha Samhitha Of Susrutha, Saareersthaana*. Ch.3, Ver.13, p-143, Chaukambha Sanskrit Sansthana, Varanasi: 2010
7. Sharma S. *Astanga Samgraha of Vagbhata, Saareera sthaana*. Ch.2, Ver.8, p-246,Chaukhambha Sanskrit Series , Varanasi:; 2007
8. Acharya JT, Acharya NR: *NibandhaSangraha by Dalhanacharya and NyayachandrikaPanjika by Gayadasa Acharya on Susrutasamhita, Saareerasthaana*. Ch.3, Ver.14. Varanasi: Krishnadas Academy, Varanasi 1998
9. Acharya JT : *Chakrapaanidattakrta Commentary of Charaka Samhita of Charaka, Shareerasthaana*.Ch.4, Ver.16, p-320,Chaukamba Surbharati Prakashana, Varanasi 2009
10. Ibidem., Ch.4, Ver.16
11. Sharma PV. *Susrutha samhitha Of Susrutha, Saareerasthaana*. Ch.3, Ver.14-15, p-143, Chaukambha Sanskrit Sansthana, Varanasi: 2010
12. Sharma S: *Astanga Samgraha of Vagbhata, Saaareera sthana*. Ch.2, Ver.9, p-246, Chaukhambha Sanskrit Series, Varanasi: 2007.
13. Acharya J T. Agnivesha, *Charaka Samhita of Acharya Charaka, Chakrapaniduttakrta, Saareerasthaana,* Ch.4, Ver.20-23, p-320 Chaukhambha Surbharrati Prakashan 2009
14. Tewari PV. Kasyapa Samhita or Vrddha jivakiya Tantra, Saareera sthaana. Ch. 2, Ver.6-9, pp-113,114, Chaukhambha Visvabharati Oriental publishers, Varanasi: 2008
15. FG Cunningham. *Williams obstetrics*. 26th ed., p-476, Mcgraw Hill; New York 2022.
16. Nesbeth KA, Samuels LA, Daley CN, Gossell-Williams M, Nesbeth DA. Ptyalism in pregnancy–a review of epidemiology and practices. *European Journal of Obstetrics & Gynecology and Reproductive Biology*. Mar 1;198:47-9, 2016
17. Lindheimer MD, Barron WM, Davison JM. Osmoregulation of thirst and vasopressin release in pregnancy. *American Journal of Physiology-Renal Physiology*. Aug 1;257(2):F159-69, 1989
18. Gomes CF, Sousa M, Lourenço I, Martins D, Torres J. Gastrointestinal diseases during pregnancy: what does the gastroenterologist need to know? *Annals of gastroenterology*. Jul;31(4):385, 2018
19. Poole CI. Fatigue during the first trimester of pregnancy. *Journal of Obstetric, Gynecologic, & Neonatal Nursing*. Sep;15(5):375-9, 1986
20. Komesaroff PA, Black CV, Cable V, Sudhir K. Effects of estrogen and progesterone on the sympathetic reactivity of normal subjects. *Circulation*. 98(25):2801-2806, 1998
21. Stanczyk FZ, Miyakawa I, Goebelsmann U. Direct effect of progesterone on basal and gonadotropin-stimulated release of luteinizing hormone and follicle-stimulating hormone. *Fertil Steril*,36(3):373-378, 1981
22. Bethea CL, Mirkes SJ, Shively CA, Adams MR. Steroid regulation of tryptophan hydroxylase protein in the dorsal raphe of macaques. *J Psychiatr Res*. 36(5):259-270,2002
23. Maguire J, Mody I. GABAAR plasticity during pregnancy: relevance to postpartum depression. *J Neuroendocrinol*.20(6):773-780, 2008
24. Heinrichs M, Baumgartner T, Kirschbaum C, Ehlert U. Social support and oxytocin interact to suppress cortisol and subjective responses to psychosocial stress. *Biol Psychiatry*. 54(12):1389-1398, 2003
25. Facchinetti F, Bagnoli F, De Leo V, Genazzani AR. Plasma levels of beta-endorphin and beta-lipotropin in pregnant women. *J Clin Endocrinol Metab*. 54(4):826-828, 1982
26. Konar H. DC Dutta's textbook of obstetrics. 8th Edition. *JP Medical Ltd;* p-69,New Delhi 2015
27. Ibidem P- 74
28. Choi J, Smitz J. Luteinizing hormone and human chorionic gonadotropin: distinguishing unique physiologic roles. *Gynecological Endocrinology,* Mar 1;30(3):174-81, 2014
29. Pascual ZN, Langaker MD. *Physiology, Pregnancy*. [Updated 2023 May 16]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024Jan-. Availablefrom:https://www.ncbi.nlm.nih.gov/books/NBK559304/
30. Orloff NC, Hormes JM. Pickles and ice cream! Food cravings in pregnancy: hypotheses, preliminary evidence, and directions for future research. *Frontiers in psychology*, Sep 23; 5:111321, 2014
31. Alex A, Bhandary E, McGuire KP. Anatomy and Physiology of the Breast during Pregnancy and Lactation. *Diseases of the Breast during Pregnancy and Lactation,* 3-7.2020:
32. Massinde A, Ntubika S, Magoma M. Extensive hyperpigmentation during pregnancy: a case report. *Journal of Medical Case Reports*, Dec;5:1-3. 2011
33. Morimoto K, O'Rourke L. Third trimester lower extremity lymphorrhea. *Case Reports in Obstetrics and Gynecology*, 2021(1):3594923, 2021;.
34. Konar H. *DC Dutta's textbook of obstetrics*. 8th Edition, p-52 JP Medical Ltd, New Delhi 2015
35. Khyat AF, Hamodah MA, Qary HA. Effect of Pregnancy on the Properties of Vaginal Wall: Overview. *Int J Healthc Sci*. Apr-Sep;5(1):439-445,2017 Available from: www.researchpublish.com. ISSN 2348-5728.

36. Paprocki R, Lenskiy A. What does eye-blink rate variability dynamics tell us about cognitive performance? *Frontiers in human neuroscience*. Dec 19; 11:620,2017

37. Javier RC, Singh PV, Shrestha J, Abdalla R, Narang P, Patel H, Yadav KP, Patel T, Fadiora OE, Shahzad H, Abbas K. Trends and Immediate Outcomes of Syncope During Pregnancy: A Narrative Review. *Cureus.* Dec 2;15(12), 2023

38. Sarkar PK, Singh P, Dhillon MS, Bhattacharya S, Singh A. Postural deviation in pregnancy: A significant debilitating balance problem which can be rectified by physiotherapeutic intervention. *Journal of Family Medicine and Primary Care*. Jul 1;11(7):3717-25,2022

39. Acharya JT : *Chakrapaanidatta Krta Commentary on Charaka Samhita of Charaka, Saareerasthaana.* Ch.4, Ver.21, p.320. Chaukamba Surbharati Prakashana, Varanasi 2009

40. King JC. The risk of maternal nutritional depletion and poor outcomes increases in early or closely spaced pregnancies. *The Journal of nutrition*. May 1;133(5):1732S-6S,2003

41. Acharya JT : *Chakrapaanidatta Krta Commentary on Charaka Samhita of Charaka, Saareerasthaana.* Ch.4, Ver.22, p-320, Chaukamba Surbharati Prakashana; 2009

42. Ibidem. Ver.23