



Review Article

## PRINCIPLE OF GATE CONTROL THEORY: AYURVEDA PERSPECTIVE

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### Article info

#### Article History:

Received: 22-11-2023

Accepted: 16-12-2023

Published: 05-01-2024

### KEYWORDS:

Gate control  
Theory of pain,  
Ayurveda  
Siddhanta, Pain  
Ayurveda  
therapeutics.

### ABSTRACT

There are many procedures explained in Ayurveda to cure pain where mechanical force is not apply like *Samhanan*, *Abhyanga*, *Udavartana* etc. Here we are hypothesizing that those procedure of Ayurveda which indicated in painful condition, work on gate control theory. As according to gate control theory touch factors reduces pain, and many procedures explained below includes touch as part of its methodology. *Charak* says about pain mechanism where he says that touch is responsible for both *Sukha Vedana* means alleviate and *Dukkha Vedana* which means pain. Here *Sukha* can understand as *Anukul Vedana* and *Dukkha Pratikul Vedana*. Also, *Acharya Sushruta* say that pain is always associated with the *Vata dosha*. If we look into the gate control theory of pain, network of pain gate there may be the network of emotional domain which needs to find out as Ayurveda procedure works with compassion and gives relief from pain. **Materials and Methods:** Understanding of Ayurvedic procedure by modern perspective is necessary for its acceptance for this various classical Ayurveda text like *Charaka*, *Sushruta* and *Vagbhata* with their famous commentary are reviewed thoroughly. Along modern physiology literature from various articles and books reviewed. **Discussion:** *Abhyanga*, etc., are the therapeutics procedure which aims to give relief from pain. All these procedures include touch sensation. All these procedures are mentioned for therapeutics as well as preventive use. **Conclusion:** It been concluded that *Abhyanga*, *Samhanan*, *Udavartana* and *Agnikarma* may work on the pain gate mechanism. All procedures included touch which works as a distractive stimulus to close the pain gate. And one of their benefits is *Sukham* which can understand as alleviation all kinds of pain.

### INTRODUCTION

Ayurveda has enormous Knowledge of every domain like physiology, pathology, medicine, preventive medicine, behavioral science. Ayurveda science said as eternal and proven continuously.<sup>[1]</sup> Three most precious contribution of Ayurveda are *Charak Samhita*, *Sushruta Samhita* and *Vagbhata Samhita*. Later sages and scholars of Ayurveda made so many contributions in Ayurveda according to need of the hour to make it easier to understand. Ancient scholar has taken help of *Darshan shastra*, knowledge of *Darshana* was dominant in that time.

Now a day modern science is taking lead, everybody understands modern science language. Ayurveda is multidimensional science, single quotation of Ayurveda can give rise to endless thought. Like in *Charak Samhita* it is mentioned that whatever knowledge is out there is already given in *Charka Samhita* and vice versa.<sup>[2]</sup> Just like deep understanding about the pain phenomenon is also explained in Ayurveda.

Pain is first sign by which anyone understands that something is wrong in their body. It is described in many diseases by various names and according to its site and intensity<sup>[3]</sup>. In Ayurveda there are many therapeutics given which helpful in pain reduction. According to modern physiology pain is highly unpleasant physical sensation caused by illness or injury. It is a signal send by brain saying that something is wrong.<sup>[4]</sup> The gate control theory for pain it is one of the physiological phenomena proposed in

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<https://doi.org/10.47070/ayushdhara.v10i6.1293>

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1965 by psychologist Ronald Melzack and anatomist Patrick Wall related to pain. When a pain stimulus is applied to any part of the body, it stimulates pain receptors as well as touch receptors. When all of these impulses reach the spinal cord through the posterior nerve root, the touch fibers (posterior column fibers) send collaterals to the pain pathway neurons. The release of glutamate and substance P from pain fibers is inhibited by touch sensation impulses that pass through these collaterals, the gate is now closed and pain transmission is no longer possible.<sup>[5]</sup> These signals are processed in the thalamus and sent to the sensory cortex. Pain perception occurs at the cortical level in the context of the person's emotional status and previous experiences. The person responds to the pain based on the integration of all these infrareds as a result, the brain is in charge of determining the severity and scope of pain. To reduce the degree and duration of pain, the brain sends a message to the spinal cord to close the gate by releasing pain medications such as opiate peptide.<sup>[6]</sup>

The ability of the body to recover depends critically on a person's capability to perceive pain. The sensation of pain is the body's way of informing us that there has been an injury, and we need to take action to ensure that healing takes place. The fact that one patient's pain is not the same as another patient's agony, even though they have undergone comparable traumas, is a crucial factor to take into account while discussing pain. Indeed, the sense of pain is subjective and is impacted by intricate interactions among biological, psychological, and social variables.<sup>[7]</sup>

There are so many procedures explained in Ayurveda to cure pain where mechanical force gets applied like *Samhanan*, *Abhyanga*, *Udavartana* etc. Therefore, this review study is done with aim to correlate the gate control theory mechanism in various pain alleviating procedures of Ayurveda. Here we are hypothesizing that those procedure of Ayurveda which indicated in painful condition, are work on gate control theory. As according to gate control theory touch factors reduces pain, and many procedures explained below includes touch as part of its methodology. In *Charak Samhita Sharir Sthana Acharya Charak* say about pain mechanism where they explained that touch is responsible for both *Sukha and Dukkha Vedana*,<sup>[8]</sup> which implies pain as *Sukha* and can be understand as *Anukul Vedana* (pleasant feeling) and *Dukkha* as *Pratikul Vedana* (unpleasant feeling).<sup>[9]</sup> Along with *Acharya Sushruta* say that pain is always associated with the *Vata dosha*.<sup>[10]</sup>

## AIM AND OBJECTIVE

1. To compare this theory with many procedures mentioned in Ayurveda.

2. To discuss about the network of emotional domain along with this network of pain gate which may be rely on the *Manas*.
3. To discuss various procedure for pain management and role of *Manas* in it. As Ayurveda procedure works with compassion and gives relief from pain.

## Scope of Study

This review study will give scope to find out mechanism of procedure from various animal model or using bioinformatics.

## RESULT

### *Samhanan*

*Samhanan* is a therapy mentioned in the Ayurveda. It is performed by hand and intermittent in nature. *Dalhana* called it as a pleasing touch (*Sukhakar Sparsha*).<sup>[11]</sup> *Sushruta* has mentioned that the '*Mridu*' type of *Samvahana* is helpful to treat *Vatarakta* which is a condition of pain<sup>[12]</sup>, *Samvahana* may either be mild (*Mridu*) or deep (*Tivra*). This procedure performs in graceful slow rhythm. In musculoskeletal disorders, therapeutic like massages are done to relax the body muscles. To relieve the pain and stiffness, and to increase joint mobility.<sup>[13]</sup> One study concluded that physiological and psychological signs showed that hand and back massages with moderate strokes might help elderly adults unwind in all kinds of circumstances. <sup>[14]</sup> As older people most of the time complains of pain, they get relieved by slow stroke massage.

### *Abhyanga*

*Abhyanga* is procedure helpful in reducing pain, where oil is get regularly applied on body surface by hand. Regular application of oil on the head gives black hairs, long and deep-rooted, it helps in proper working of sense organs.<sup>[15]</sup> Daily scalp massage prevents headache, baldness, greying of hair, and hair fall. *Pada Abhyanga* or foot massages bestows good vision and also has been proven to reduce stress, agitation, and behavioral problems in older people with dementia.<sup>[16]</sup> Penetration mechanism through skin surface work here broadly. As *Abhyanga* also help to reduce the intensity of pain and get relief from pain in many conditions, in various physical ailments, especially musculoskeletal disorders, therapeutic massages are done to relax the body muscles, relieve pain and stiffness, and increase joint mobility. It was also seen that chronic pain and fatigue were significantly reduced with *Abhyanga* in people with spinal cord injury in a clinical study <sup>[17]</sup>. *Abhyanga* also has been found useful in reducing anxiety, stress, and depression. The effect has been elicited in a clinical study on post stroke patient.<sup>[18]</sup> One study concluded that physiological and physical and psychological evidence showed that slow-moving hand and back

massages might help elderly people unwind<sup>[19]</sup> across all settings. Besides this direct therapeutic application, as *Abhyanga* has long spectrum benefits give relieve from pain, as this procedure includes touching the body surface therefore, it can say that gate mechanism works in *Abhyanga* therapy.

#### **Udavaratana**

*Udavaratana* it is one of the procedures described by *Acharya Sushruta* in *Anagatabadha Adhyaya*.<sup>[20]</sup> Which is indicated for the prevention of health. This procedure is also mentioned in many disease conditions like *Sthaulya* etc. This is the procedure of rubbing the *Churna* or *Kalka* on the body surface in the opposite direction of body hair called *Pratiloma Gati*. It helps to reduce the extra fat on the body surface as well as pacify *Vata dosha* gives stability to the body and makes luster full skin. One study on *Katishula* (low back pain) has shown significant effect of *Udavartana* with *Shunti Churna* in reducing pain. *Shunti Churna Udavartana* using 50gm in *Kati Pradesh* for twenty minutes in morning empty stomach with three consecutive sequences in a day was done. By this mean VAS score reduce from 7.26 to 2.96 which is highly significant.<sup>[21]</sup>

#### **Udagarshana and Utsadana**

*Udagarshana* and *Utsadana* extension of *Udavartana* procedure *Udagarshana* and *Utsadana* also helps in many aspects like its expands the vessels and increases the blood flow to the skin surface and increases metabolic activity in the cell as mentioned in quotation as *Twakastha- Agneyashcha Tejanam*.<sup>[22]</sup> which means *Udagarshana* and *Utsadana* both procedures reduce *Ama* (toxins accumulated on the skin surface, subsides itching, give stability, lightness, subsides stiffness with this also pacify the *Vata*, and pacifying *Vata* is nothing but curing the pain. therefore, at this point touch factor is included and it helps to reduce pain at some level so we can say that gate control theory may work here.

#### **Agnikarma**

*Agni karma* is one the famous entity of Ayurveda where with using the hot metallic rod the skin surface gets touched this therapy mainly used in the disease condition like *Twaka Mansa Sira Snayu Gata* (musculoskeletal and vascular) *Ruja* (pain), along with this it is been used for condition like skin warts, *Charmakil*, tumors, etc. This procedure also treat the condition like sinus.<sup>[23]</sup> All the mechanism behind its action has many aspects one this is pain gate theory. As *Agnikarma* gives relief from pain it surely closes the pain get the relives the pain the blocking nociceptors. As it can see that this procedure includes the touching of skin surface, pain gate theory can apply here too. One of study of effect of *Agnikarma* along with

*Raktmokshana* on *Kati Sandhigata Vata* was done, this study has shown significant effect in pain reduction by *Agnikarma* both by subjective and objective parameters.<sup>[24]</sup>

#### **DISCUSSION**

##### **Samhanan**

*Samhanan*, *Abhyanga*, *Udavartana* and *Agnikarma* are the therapeutics procedure which aims to give relief from pain. All these procedures include touch sensation. All these procedures are mentioned for therapeutics as well as preventive use. As discussed, explained earlier about *Samhanana* and gate control theory, many factors included in the *Samhanana* procedure are part of the mechanism of gate control theory. Benefits of *Samhanana* explained by *Acharya Sushruta* are showing that *Samhanana* is giving relief from pain, it generated likelihood for things, it gives plenty of sleep, it pacifies *Kapha*, *Vata*, and *Shrama*, *Mana-Raktaprasadakar*, and *Sukham*.<sup>[25]</sup> This *Sukham* can understand as relief from pain physical and mental too.<sup>[8]</sup> In general, oil massage prevents an excess increase of *Vata*, nourishes body tissues, and imparts complexion, color, and strength to the skin<sup>[14]</sup>.

##### **Abhyanga**

As seen in *Abhyanga* it is the procedure of rubbing oil on body surface.<sup>[26]</sup> It includes many mechanicals things like direction of movement of hand of masseur, site of pain etc. As touch factor is included in this process it can be said that, it works on pain gate theory. As oil is been used in these procedures it has its own effect and so selection of procedure varies according the *Doshanubandha* (association of *Dosha*) in pain. Oil with their *Snigdha Guna* helps to relieve *Ruksha Guna* from body and pacify mental stress with healing touch.<sup>[27]</sup>

##### **Udavartana**

*Udavartana* mainly works on *Kapha* and *Vata Dosha*. *Vata Dosha* is responsible for pain and *Udavartana* help in reducing pain by pacifying *Kapha* and *Vata Dosha*. It is mainly helpful in pain associated with *Kapha dosha* so in pathophysiology of pain where *kapha* is involved, *Udavartana* gives good relief and touch to the skin surface involved here so it works on gate control theory. *Agnikarma* is also help in reducing pain.

##### **Agnikarma**

*Agnikarma* is done by various modalities like *Pippli*, *Ghrita*, and *Shalaka*<sup>[28]</sup> etc. In this procedure touch to the skin surface is involved so pain gate mechanism works here.<sup>[29]</sup> As by Ayurveda perspective aggravated *Shita Guna* (cold properties) and *Sthambha Guna* (stiffness properties) of *Vata* and *Kapha* respectively causes pain. In such condition *Ushna Guna*

of *Agni* and also *Guna* of instrument used for the procedure help in reduction of pain by pacifying *Shita Guna* and *Sthamba Guna*. In *Charaka Samhita Sharir Sthana Acharya Charaka* has stated that touch of skin surface plays a major role in expression and relief from pain [30] whereas in gate control theory scientist has stated the same thing that is forceful touch to skin first activated nociceptors and afterward light massage etc. activated distractive stimulus and this closes a gate and pain get subsides.

One of the important factor describes in Ayurveda science that, for expression of any sense organ *Manas* (mind) plays a major role. [31] In the complex mechanism of gate control theory, somewhere *Manas* play a major role. Like, the touch that closes the gate is more or less dependent on the *Manas* factor because, in Ayurveda, *Manas* are called *Indriya Gochara*. [32] Which means it control all other organs functioning therefore, when we talk about *Samhanana* or any other similar procedure which shows the importance of *Manas* and the external touch of *Sparshendriya* can say that they work through the gate theory mechanism as *Mana* involved in there functioning.

#### CONCLUSION

It been concluded that *Abhyanga*, *Samhanan*, *Udavartana* and *Agnikarma* might work on the pain gate mechanism. All procedures included touch which works as a distractive stimulus to close the pain gate. In these all procedures, one of the benefits is *Sukham* and that *Sukham* can understand as relief from all kinds of pain.

#### REFERENCES

1. Yadavji Trikamji Charak Samhita with Ayurveda deepika commentary (sutrasthana, 30<sup>th</sup> Adhyaya, 27 verse) New Delhi, Chaukhamba Publications: 2014 p. 188
2. Yadavji Trikamji Charak Samhita with Ayurveda deepika commentary (Siddhithana, 12<sup>th</sup> Adhyaya, 54 verse) New Delhi, Chaukhamba Publications: 2014 p. 738
3. Yadavji Trikamji Sushruta Samhita with Nibandha sangraha commentary (uttartantra 42<sup>nd</sup> Adhyaya 81<sup>st</sup> to 87 verse) New Delhi, Chaukhamba Publications: 2014 p. 723
4. K Sembulingam and Prema Sembulingam P, essentials of medical physiology, 6<sup>th</sup> edition, new Delhi, Jaypee brothers' medical publishers 2012 chapter 145, pg no 838.
5. K Sembulingam and Prema Sembulingam P, essentials of medical physiology, 6<sup>th</sup> edition, new Delhi, Jaypee brothers medical publishers 2012 chapter 145, pg no 841.

6. Ropero Peláez FJ, Taniguchi S. The Gate Theory of Pain Revisited: Modeling Different Pain Conditions with a Parsimonious Neuro-computational Model. *Neural Plast.* 2016; 2016: 4131395. doi:10.1155/2016/4131395K
7. Trachsel LA, Munakomi S, Casella M. Pain Theory. [Updated 2023 Apr 17]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK545194/>
8. Yadavji Trikamji Charak Samhita with Ayurveda deepika commentary (sharirsthana, 1<sup>st</sup> Adhyaya, 133 verse) New Delhi, Chaukhamba Publications: 2014 p. 299
9. Acharya Anaabhatta. Tarkasangraha with Deepika commentary edited by V.N. Jha. text 60 reprint in 2010, Chinmay International Foundation, Shodha Sanstana kerla, page no 109
10. Yadavji Trikamji Sushruta Samhita with Nibandha sangraha commentary (uttartantra 42<sup>nd</sup> Adhyaya 81<sup>st</sup> to 87 verse) New Delhi, Chaukhamba Publications: 2014 p. 723
11. Yadavji Trikamji Sushruta Samhita with Nibandhasangraha commentary (Chikitsa Sthana 24<sup>th</sup> Adhyaya 83<sup>rd</sup> verse) New Delhi, Chaukhamba Publications: 2014 p. 490
12. Yadavji Trikamji Sushruta Samhita with Nibandha sangraha commentary (Chikitsa Sthana 5<sup>th</sup> Adhyaya 16<sup>th</sup> verse) New Delhi, Chaukhamba Publications: 2014 p. 427
13. Harris, M., & Richards, K.C. (2010). The physiological and psychological effects of slow-stroke back massage and hand massage on relaxation in older people. *Journal of clinical nursing*, 19(7-8), 917-926. <https://doi.org/10.1111/j.1365-2702.2009.03165.x>
14. Lee YH, Park BN, Kim SH. The effects of heat and massage application on autonomic nervous system. *Yonsei Med J.* 2011; 52(6): 982-989. doi:10.3349/ymj.2011.52.6.982
15. PV Sharma. Astang Hridaya of vagbhat with sarvangasundara by arundatta and Ayurveda rasayana (Sutrasthana, 2<sup>nd</sup> Adhyaya, 8<sup>th</sup> verse) reprinted 2014, New Delhi, Chaukhamba Publications, p. 26
16. Yadavji Trikamji Charak Samhita with Ayurvedadeepika commentary (sutrasthana, 5<sup>th</sup> Adhyaya, 92 verse) New Delhi, Chaukhamba Publications: 2014 p. 43
17. Singh, S. K., & Rajoria, K. (2015). Ayurvedic approach in the management of spinal cord injury: A case study. *Ancient science of life*, 34(4), 230-234. <https://doi.org/10.4103/0257-7941.160870>

18. Sankaran, R., Kamath, R., Nambiar, V., & Kumar, A. (2019). A prospective study on the effects of Ayurvedic massage in post-stroke patients. *Journal of Ayurveda and integrative medicine*, 10(2), 126-130. <https://doi.org/10.1016/j.jaim.2018.02.137>
19. Harris M, Richards KC. The physiological and psychological effects of slow-stroke back massage and hand massage on relaxation in older people. 2010. In: Database of Abstracts of Reviews of Effects (DARE): Quality-assessed Reviews [Internet]. York (UK): Centre for Reviews and Dissemination (UK); 1995-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK79563/>
20. Yadavji Trikamji Sushruta Samhita with Nibandha sangraha commentary (Chikitsa Sthana 24<sup>th</sup> Adhyaya 51<sup>st</sup> verse) New Delhi, Chaukhamba Publications: 2014 p. 489.
21. B M Rashmi, Kumari Nisha, Ajantha. Upashayatmaka Effect of Shunthi Churna Udvartana in Katishula. *International Journal of Ayurveda and Pharma Research*. 2017;5(8):23-27 Retrieved from <https://ijapr.in/index.php/ijapr/article/view/743>
22. Yadavji Trikamji Sushruta Samhita with Nibandha sangraha commentary (Chikitsa Sthana 24<sup>th</sup> Adhyaya 52<sup>nd</sup> & 56<sup>th</sup> verse) New Delhi, Chaukhamba Publications: 2014 p. 489.
23. Yadavji Trikamji Sushruta Samhita with Nibandha sangraha commentary (Sutra Sthana 12<sup>th</sup> Adhyaya 10<sup>th</sup> verse) New Delhi, Chaukhamba Publications: 2014 p. 52
24. Joshi, Foram et al. Effect of Agnikarma (therapeutic heat burns) and Raktamokshana (therapeutic bloodletting) in the management of Kati Sandhigata Vata (lumbar spondylosis). *Ayu* vol. 40, 2 (2019): 79-88. doi:10.4103/ayu.AYU\_142\_16
25. Yadavji Trikamji Sushruta Samhita with Nibandha sangraha commentary (Chikitsa Sthana 24<sup>th</sup> Adhyaya 83<sup>rd</sup> verse) New Delhi, Chaukhamba Publications: 2014 p. 490
26. Jyotimitra Acharya. Astang sangraha with shashilekha Commentary (Sutrasthana, 3<sup>rd</sup> Adhyaya, 27<sup>th</sup> verse) reprinted 2019, Varanasi, Chaukhamba Publications, p. 20
27. Jyotimitra Acharya. Astang sangraha with shashilekha Commentary (Sutrasthana, 3<sup>rd</sup> Adhyaya, 28<sup>th</sup> verse) reprinted 2019, Varanasi, Chaukhamba Publications, p. 20
28. Yadavji Trikamji Sushruta Samhita with Nibandha sangraha commentary (sutra Sthana 12<sup>th</sup> Adhyaya 4<sup>th</sup> verse) New Delhi, Chaukhamba Publications: 2014 p. 51
29. Mahesh kumar et al. 'application of agnikarma in surgical practices' first edition 2017, Chaukhamba Orientalia Varanasi page no. 80
30. Yadavji Trikamji Charak Samhita with Ayurveda deepika commentary (sharirsthana, 1<sup>st</sup> Adhyaya, 133 verse) New Delhi, Chaukhamba Publications: 2014 p. 299
31. Yadavji Trikamji Charak Samhita with Ayurveda deepika commentary (sharirsthana, 1<sup>st</sup> Adhyaya, 18 verse) New Delhi, Chaukhamba Publications: 2014 p. 288
32. Yadavji Trikamji Charak Samhita with Ayurveda deepika commentary (sharirsthana, 1<sup>st</sup> Adhyaya, 31 verse) New Delhi, Chaukhamba Publications: 2014 p. 290

**Cite this article as:**

Bhagyashri A. Chakole, Mahesh K Vyas, Kamal Kumar. Principle of Gate Control Theory: Ayurveda Perspective. *AYUSHDHARA*, 2023;10(6):86-90.

<https://doi.org/10.47070/ayushdhara.v10i6.1293>

**Source of support: Nil, Conflict of interest: None Declared**

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