

MECHANISM OF OTTRADAM (FOMENTATION)**¹D. AMARNATH, ²A.NITHYA SRI, ³S. UTHRAPATHI, ⁴R. KANIMOZHI .**¹CRRI, Sivaraj Siddha Medical College, Salem²CRRI, Sivaraj Siddha Medical College, Salem.³Guide & Assistant Professor, Department of Varmam, Pura & Sirappu Maruthuvam, Sivaraj Siddha Medical College, Salem.⁴HOD, Department of Varmam, Pura & Sirappu Maruthuvam,
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INTRODUCTION:

Pain is an unpleasant and emotional experience associated with or without tissue damage. Pain is one of the types in sensory symptom. It is produced by real or potential injury to the body. Mainly there are two types of pain - acute and chronic pain^[1]. Pain is measured through 11 point scale, verbal rating scale, behavioral rating scale, pain questionnaire. In treatment aspect mainly drug of choice include analgesic over the counter medicine are good in pain management mainly of two types: corticosteroids like dexamethasone, NSAID like Tylenol (Acetaminophen), aspirin, ibuprofen etc. Opioids are powerful pain relievers. Treatment for chronic pain include analgesic, anti-depressant, anti-convulsant, anti-depressant. Even though they are effective but have high side effect with risk of addiction. Side effects like gastric irritation and bleeding, headache, renal impairment, confusion, hyperglycaemia, constipation, rash, anxiety, hypertension, dry mouth, nausea, vomiting, sedation^[2].

In *siddha* system of medicine, single herbal preparation and metallic preparations like aarumugachendhooram, ayaverrachendhooram, external oils like pindathailam, vaadhakesari, mayanathailam, vishamushti are used in pain management^[3].

According to *siddha* literature, steam inhalation (*Vedhu*), fomentation (*Ottradam*), poultice (*Patru*), liquid application (*Poochu*), stimulation of vital points (*varmam*), physical manipulation (*Thokkanam*) are used to manage and cure *vaadha* dominated disease. *Ottradam* is one of the superficial heat application on affected areas of the body. There are some *siddha* literatures, which explain the administration of *ottradam* in knee pain, bronchial

asthma, hip pain, cervical pain, OA pain^[4]. These studies deal only with pharmacological actions of herbs or drugs but did not mention about the mechanism of ottradam. This paper explains the general aspect of mechanism of *ottradam* and to evaluate the scientific validation for *ottradam*.

GENERAL MECHANISM OF OTTRADAM (HEAT FOMENTATION) :

BODY PARTS	ACTION OF OTTRADAM	RESULT
BLOOD VESSELS	<ul style="list-style-type: none"> • Release bradykinin and nitric oxide - Vasoactive mediators^[5]. • Cause vasodilation^[8]. • Increase capillary permeability^[8]. 	<ul style="list-style-type: none"> • Increase blood flow at the site of tissue damage, healing through increasing the supply of nutrients & oxygen^[5]. • Reduction of edema^[9]
BLOOD	<ul style="list-style-type: none"> • Decrease in blood viscosity^[8] 	<ul style="list-style-type: none"> • Accelerates the transport of leucocytes and antibodies to the injured area^[8]
CONNECTIVE TISSUE	<ul style="list-style-type: none"> • Decrease the viscosity in response to heat^[5]. 	<ul style="list-style-type: none"> • Decrease joint stiffness by improving the range of movements and enhancing tissue extensibility^[9].
MUSCLE	<ul style="list-style-type: none"> • Localized^[6] 	<ul style="list-style-type: none"> • Promotes angiogenic environment and enhance muscle strength^[6]
TISSUE	<ul style="list-style-type: none"> • Van't Hoff's law^[9] • An elevation in tissue temperature just 1°C is associated with 10-15 % increase in local metabolism^[7] • Increase in tissue metabolism^[8] • Increase in enzymatic activity increases cellular biochemical reactions^[9] 	<ul style="list-style-type: none"> • Increases oxygen hemoglobin dissociation results in increased oxygen availability for tissue repair (healing process)^[9] • Blood flow increases due to the increased local temperature^[8]
SWEAT	<ul style="list-style-type: none"> • Increase sweating owing to the 	<ul style="list-style-type: none"> • Removal of toxins, waste metabolites

GLAND S	stimulation of anterior hypothalamus ^[9]	and excessive water content through sweat ^[9] .
MEMBRANE	<ul style="list-style-type: none"> Analgesic effect of heat partly mediated by transient receptor potential membrane channel^[5] Activation of TRP vanilloid 1 receptor in brain^[5] 	<ul style="list-style-type: none"> Regulate anti nociceptive pathway Relax muscles and increase muscle flexibility^[5]
SKIN	<ul style="list-style-type: none"> Pressure activates proprioceptors^[5] Removes our wastes as toxins^[18] 	<ul style="list-style-type: none"> This receptor blocks the transmission of pain signal to spinal cord and brain^[5] It dilates all body channels for the cleansing^[18]
NERVE	<ul style="list-style-type: none"> Activates temperature sensitive nerve ending (Thermoreceptors)^[5] 	<ul style="list-style-type: none"> Antinociceptive (block the process of pain signal)^[5].

DISCUSSION:

According to *siddha* literature, many ailments were managed and cured by *ottradam* (Fomentation). They are arthritis, body pain, bronchial asthma, delirium, headache, muscle cramps, joint pain, fever, sinusitis, chronic abdominal colic pain, etc^{[4],[10]}. The process of *ottradam* is also done by the means of black rock powder, egg shell, paddy husk, rice bran, wheat husk, brick stone, calcium carbonate crystal which are used to give various proportions of heat^[4]. Fresh leaves such as *Vitex negundo* (*Nochi*)^[11], *Calotropis gigantea* (*Erukku*)^[12], *Ricinus communis* (*Aamanakku*)^[13], *Datura metal* (*Oomathai*)^[14], *Cardiospermum halicacabum* (*Mudakaruthan*)^[15], *Clerodendrum phlomis* (*Thazhuthalai*)^[16] etc and Medicated preparations like *Kaayathirumenithailam*, *Pinda thailam*, *Vishamushthailam*^[3], Sesame oil, castor oil etc also have their own pharmacological actions Anti-inflammatory^{[11][12][13][14][16]}, Analgesic^{[11][12]}, Anti arthritic activity^{[11] [12] [14]}, vasodilation activity^[12], Antinociceptive activity^{[11][13]}, Diaphoretic^[15]. Thus the pharmacological activity of herbs and raw materials are used to treat *vaadha* dominated disease and regulate the three humours (*Vaatha, pitha, kabha*) of the body along with *ottradam* by above mentioned mechanism. This activates temperature-sensitive nerve endings (thermoreceptors) that produce signal which blocks the transmission of pain signals to spinal cord and brain. TRP vanilloid 1 (TRPV1) receptors expedite the neural transduction

of heat and the processing of nociceptive pain. Thus both *ottradam* and properties of material used for *ottradam* helps in relieving pain. These mechanisms are performed to reduce muscle tonicity and relax muscles, thereby reducing spasms and musculoskeletal pain and increase muscle flexibility^[5]

ANALGESIC PATHWAY :

Fast pain sensation - A δ fibers - neurons of marginal nucleus -posterior gray horn.

Slow pain sensation - C type of nerve fibers - neurons of substantiagelatinosaofRolando – posteriorgrayhorn.

Fibers of analgesic pathway arise from frontal lobe of cerebral cortex and hypothalamus and terminate in grey matter and descend through lateral white column of spinal cord and reach afferent pain pathway.

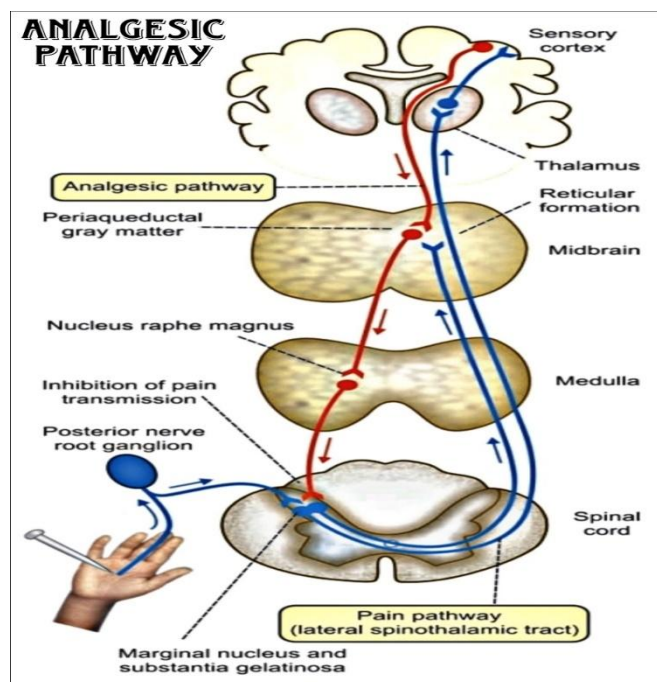
Synapses are between i. A δ type afferent fibers and neurons of marginal nucleus. ii. C type afferent fibers and neurons of substantia gelatinosa of Rolando.

At synaptic level it releases neuro transmitters like **ENKEPHALIN, DYNORPHIN AND ENDORPHIN** and inhibit the pain transmission^[1]

ENKEPHALIN :It is a natural analgesics that control pain. They are produced from β – endorphin which is derived from pro – opiomelanocortin. They are peptide neurotransmitters, hence known as opioid peptides. They bind as morphine opiates that control endogenous pain perception^[17] [Fig 1].

Ottradam which is also called as heat therapy relieves pain by stimulating the release of endogenous pain relievers (opioid peptides) which closes the gate and blocks the pain signal. Analgesic effect of heat is mediated by TRP membrane potential. The activation of TRP V1 receptors in the brain may regulate anti-nociceptive pathways^[5]

FIGURE : 1



CONCLUSION:

Ottradam is one of the non pharmacological therapy in siddha system of medicine used in various kind of infective and inflammatory disorders. This review article tries to give validation for mechanism of *ottradam* in muscles, connective tissues, blood, blood vessels, tissues, sweat glands, skin and nerve endings based on scientific way.

ACKNOWLEDGEMENT:

I would like to extend my sincere thanks and gratitude to The Chair Woman (SSMC), The Vice Chairman, The Principal, HOD and My Guide who have contributed and supported a lot in Presenting this paper. The completion of this paper is not possible without their guidance.

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