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Research Article

A COMPREHENSIVE STUDY OF *GULPHA MARMA* WITH SPECIAL REFERENCE TO *ABHIGHATHA PARINAMA*

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KEYWORDS: *Gulpha Marma,* Ankle joint, *Rujakara Marma, Abhighatha Parinama.*

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ABSTRACT

Ayurveda has classified the vital points in the body into 107 and named them *Marma. Gulpha Marma* is one among them, which is located at joint of ankle and foot with a measurement of 2 *Angula*. It is classified under the group of *Marma* which results pain when injured. The other symptoms are stiffness and limping. Anatomical correlation of *Gulpha Marma* is given to the ankle joint, the most frequently injured sites as it is located between the stable leg and mobile foot. Abnormal and excessive force will bring injuries to the joint, such as sprain, ligament injury, fracture etc. so the study was conducted in two phases- the location, structures and *Abhighatha Parinama* of *Gulpha Marma* were analyzed with the help of data collected from authentic textbooks, published journals etc. the observational study on 30 samples with *Gulpha Marma Abhighatha* was done to know structural and functional changes in ankle joint. The ankle joint injuries showed *Gulpha Marma Abhighatha lakshana* of *Ruja, Sthabdatha* and *Khanjatha*. Structural changes were evaluated with radiological study. The study turned out to be positive. The *Gulpha Marma Abhigata* leads to *Ruja* and *Stambha*, further if it is not treated that may leads to the disability of the joint i.e. *Vaikalyakara*.

INTRODUCTION

Ayurveda is the ancient science of life and health care. It is an intricate medical system originated thousands of years ago. It uses inherent principles of nature to maintain health in a person by keeping individuals mind, body and soul in perfect equilibrium with nature. The aim of Ayurveda is to prevent illness and heal the diseased and thus preserving life. To eliminate disorders and dysfunctions of the body, the description of anatomy of human body should be known in detail. Ayurveda has explained anatomy in a very broader aspect. One of the unique concepts discussed under this is *Marma*, the vital points of the body.

The development of science of *Marma* took place from *Saraswathi* culture to the time period of Charaka, Sushrutha, Vagbhata. According to Sushrutha, *Marma* point is an anatomical site where *Mamsa* (muscles), *Sira* (blood vessels), *Snayu* (tendons), *Asthi* (bones), *Sandhi* (joints) confluence[1]. *Prana* is embodied at the site of *Marma*. There are 12 components of *Prana*. They are Agni, Soma, *Vayu*, *Satwa*, *Rajas*, *Tamas, Bhootatma* and Panchendriya[2]. These are the basic factors to sustain life. So *Marma* is considered as "the vital points" in the body. Ayurveda enumerated 107 *Marmas* and classified it according to REGION (*Avayava Bhedena*), COMPOSITION (*Asraya Bhedena*), DIMENSION (*Pramana Bhedena*), PROGNOSIS (*Vyapath Bhedena*), and NUMBER (*Sankhya Bhedena*). Among them, *Gulpha Marma*, located at the lower extremities at joint, are two in number, measuring 2 *Angula* in length and causes agonizing pain when injured. The associated symptoms of stiffness and limping are also noted.

Gulpha Marma

Derivation of word *Gulpha* is from the root word '*Gal*' and '*Fuk*' *pratyaya*[3]. Etymologically the word '*Gulpha*' has been derived from the Sanskrit root 'Gal' meaning Ankle. It is located between *Paada* and *Jangha* with 2 *Angula* in length[4]. It is classified under *Rujakara Marma* as the consequences of its injury are *Ruja, Sthabdatha* and *Khanjatha*[5]. *Gulpha Marma* is anatomically located at *Gulpha sandhi*. *Gulpha* is structurally a *Kora Sandhi*[6]. It is located in both lower extremities. Main functions are weight bearing and locomotion. Functionally it is a *Bahuchala Sandhi* and is correlated to ankle joint between stable leg and mobile foot, which is a modified hinge joint. The unique design of ankle joint makes it a very stable joint. The ankle- foot complex has a number of distinct features to optimize its role in weight bearing. The complementing structures of the foot allow it to sustain large weight bearing stresses under a variety of surfaces and activities that maximize stability and mobility. It is one of the most frequently injured sites as it is subjected to great variety of forces like standing, walking, running etc. Abnormal and excessive force will bring injury to the joint such as sprain, ligament injury, fracture etc[7].

Any injury to ankle joint eventually results in *Gulpha Marma Abhighatha* showing the features of pain, restricted movements and limping gait.

Site	*Sakha*-lower limb
Size	2 *Angula*
Composition	*Sandhi Marma*
Consequences of trauma	*Rujakara*
Symptoms	*Ruk, Sthabdatha, Khanjatha*

Objectives of the Study

To study *Gulpha Marma* from Ayurveda and modern aspect and to evaluate structural and functional changes in *Gulpha Marma* injuries.

Source of Data: Subjects attending the Outpatient Department of S.D.M college of Ayurveda and hospital Hassan, suffering from *Gulpha Marma Abhighatha.*

MATERIALS AND METHODS

The study will be conducted in two phases.

1. Conceptual study

Books, literature, journals including those published on the concept related to the subject related to ankle joint, and study of *Gulpha Marma* and *Gulpha Sandhi* was done from Ayurvedic texts and contemporary science.

2. Observational study

Inclusion criteria

The study is observational type which was conducted in 30 individuals of either gender above 16 years who is attending the Outpatient Department of S.D.M college of Ayurveda and hospital Hassan, suffering from *Gulpha Marma Abhighatha.*

Exclusion criteria

Individuals with Rheumatoid arthritis, congenital deformity and Amputation were excluded from the study.

A prepared consent form and case record form was used. Radiograph view for affected *Gulpha* region was taken. Movement of the affected ankle was measured by goniometer and Pain chart was applied. The Subjective criteria of restricted movement were noted. The data thus generated was tabulated and assessed statistically.

A total of 30 subjects who fulfilled the inclusion criteria were registered to the study by signing the written consent form.

Observation on demographic data

Majority of them was males (73.3%) and of the age group 16-25 years ie, 43.3%. majority of the subjects (40%) were students. 20% were housewives, 13.3% each were drivers and farmers. Rest were business men, bank employees etc.

Observation on clinical data

60% of the subjects had injury on right ankle while 40% was on left. The mode of injury was reported as fall in 43.3%, sports injury in 33.3% and road traffic accident in 23.3% of cases.

In *Darshana Pareeksha*, presence of *Sopha* (swelling) and *Kriyahani* (loss of function) were observed in all 30 patients. During *Sparshana Pareeksha, Sparshana Asahatwa* (tenderness) was less in 50% and more in other 50% of the subjects.

Detailed examination on *Marma Abhighata Lakshana* was done on the subjects. All three *Gulpha Marmabhighatha lakshana* were found in all 30 patients. *Ruja* or pain was mild in 40% of the subjects. 30% had moderate pain and another 30% had severe pain.

Sthabdatha or loss of function was present for all 30 patients and the range of movements were evaluated by goniometer. The four movements of the ankle joint viz., dorsi flexion, plantar flexion, inversion and eversion were measured. 60% of subjects had moderate impairment in dorsi flexion, 26.67% had mild and 13.33% had severe impairment. In plantar flexion 46.67% showed moderate, 36.67% showed mild and 16.67% showed severe deformity. 46.67% had moderate, 30% had severe and 23.33% had mild disability to movement of inversion. Moderate range of motion of eversion was noted for 60% of subjects. 30% had severe and 10% had severe difficulty in eversion. *Khanjatha* or limping was severe 36.7%. 33.3% had moderate limping and 30% had mild limping.

Observation on radiological examination

Structural changes in x-ray were present in 56.7% of patients. Joint space was normal in 93.3% subjects. One patient had reduced joint space and one had dislocated joint.

OBSERVATIONS AND RESULTS

Measurement	Dorsiflexion		Plantar flexion		Inversion		Eversion	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Mild	8	26.7	11	36.7	7	23.3	3	10.0
Moderate	18	60.0	14	46.7	14	46.7	18	60.0
Severe	4	13.3	5	16.7	9	30.0	9	30.0

DISCUSSION

Discussion on conceptual study

Different Ayurvedic texts and modern anatomy text books are critically reviewed for the study of *Gulpha Marma*. The old references on *Marma* were procured from *Rigveda, Yajurveda, Ramayana*, and *Mahabharata*.

The Ayurvedic classics explain the site of *Gulpha Marma* is where the *Paada* and *Jangha* meet together or the part of body where the foot is connected with the leg. As per Dr. Ghanekar, *Gulpha* is the ankle joint which includes tibiofibular and talocrural articulation. In medical terminology, "ankle" can refer broadly to the region or specifically to the talocrural joint. The main bones of the ankle region are the Talus (in the foot), and

the Tibia and Fibula (in the leg). Among the 12 components of *Prana*, there is a predominance of Agni and *Vayu* in *Gulpha Marma*. Any trauma to the site causes excruciating pain as *Vayu* is the basic humor which causes pain in the body.

Gulpha Marma is a *Sandhi* predominant *Marma*, or one which is located over a joint. But other structures are also (*Mamsa, Sira, Snayu* and *Asthi*) involved in the *Marma*. All these structure may be collectively present at the site, completely or partially.

Compositions of *Gulpha Marma* are correlated with that of ankle joint as:

MAMSA- Peroneus longus, Peroneous brevis, superior fibular retinaculum.

SIRA- Perforating branch of Fibular Artery, Fibular nerve

SNAYU- Lateral ligament of the ankle which consists of three separate ligaments

1. Anterior talofibular ligament, a flat weak band
2. Calcaneofibular ligament
3. Posteriortalofibular ligament.

ASTHI – Tibia, Lateral malleolus of Fibula and Talus.

SANDHI - Joint between Tibia, Fibula and Talus.

Angula Pramana of *Gulpha Marma* is 2 *Angula* which means that area where there is maximum chance of injury to the *Gulpha Marma*. And in ankle region maximum chances of injury is at the lateral side because of weaker lateral collateral ligament.

Ruja is the aches and pains felt both physically and psychologically as a result of trauma. It is the first signal of any injury which provokes nociceptive pain response. *Sthabda paadatha* is *Kriyahani* or functional disability. Any injury to ankle causing inflammation, nerve tissue damage etc can end up in this clinical condition. Ankle injuries which damage the tendons of the muscles such as flexor hallucis longus etc, lateral ligament and produce lameness or *Khanjata*. The elements of ankle joint namely tendon, ligament and bones have together role in maintaining the stability and integrity of the joint. Any trauma to these will cause biomechanical dysfunction of the joint resulting *Ruja*, *Sthabda paadatha* and *Khanjatha*.

Discussion on case study

Among the 30 registered subjects most of them were of younger age group especially of 18 to 25 years. Among the subjects taken for study, 22 (73.33%) are males and the rest 8 (26.7%) are females. According to Langevoort G et.al they reported high risk of Ankle injury for men[8], whereas Hosea TM et.al observed high risk for females[9]. According to Nordin et.al Gender and age etc simple factors can impact on the biomechanics of the ankle, and various pathologies over can influence the range of motion and ankle power.[10]

Most of them were students. The increased physical activity of the young age group and student community can be correlated with this incidence. The housewives who fall the second category of incidence are also prone to injury because of strenuous household works. Ankle injuries are the most common injuries in sports and recreational activity. For this reason, probably, these injuries tend to occur primarily to young people.[11]

18 subjects had right ankle injured and rest with left ankle. All the subjects reported with the presenting complaint of pain with or without walking. All had swelling in different severities. The ankle, as a weight bearing joint and major function in walking contributes to such presenting complaints when injured. Free movements of the joint were also hampered. During *Sparsana Pareeksha*, all subjects showed tenderness. Interrogation with the patient revealed the mode of injury- for 13 subjects' mode of injury was fall. 10 were sports injury. In general sports injury among countries, the ankle was the second most common injured body site after the knee, and ankle sprain was the most common type of ankle injury[12]. During fall and playing, the weight bearing joint is prone to trauma as it has its action majorly on walking and running. 7 of subjects reported with road traffic accident as cause. The cause of injury also determined the severity of *Marmabhighatha Lakshana*. Ankle injuries are the most common injuries in sports and recreational activity. For this reason, probably, these injuries tend to occur primarily to young people[13]. However, sports is one of the major causes of injuries which is comparable to traffic accidents, home and leisure accidents, occupational injuries, and violence.[14]

Ruja or pain was mild in 40% of the subjects as they experienced pain on walking. 30% had moderate pain as they had pain on any movement. The other 30% had severe pain even without any movement. The grading of the pain will depend on the type of injury. While evaluating the symptom *Ruja* in each type of injuries, those with sports injuries, 5 had only mild *Ruja*, 3 had moderate and 2 had severe pain. Among the patients reported with trauma due to fall 5 each were recorded with mild and moderate and severity of pain was increased in 3. In Road traffic accident injuries only one was with mild *Ruja*, two of them with moderate and 4 with severe pain. Severe pain was noted more in the cases of RTA. A fracture or a dislocation causes severe *Ruja*, while a sprain or a small hit will be presented with mild *Ruja*. For ankle sprained once to four times, the major residual problem is pain[15].

Sthabdatha or loss of function was present for all 30 patients and the range of movements were evaluated by goniometer. The movements of ankle joint are plantar flexion and dorsiflexion along with accessory movements; inversion and eversion. Normal ROM of these are required for the locomotion and recreational activities. Various injuries to the associated structures of ankle joint like ligaments, tendons, muscles or bones can impair the range of motion. The altered ROM depends upon the severity of trauma of the structure involved.

60% of subjects had moderate impairment in dorsi flexion, 26.67% had mild and 13.33% had severe impairment. In plantar flexion 46.67% showed moderate, 36.67% showed mild and 16.67% showed severe deformity. 46.67% had moderate, 30% had severe and

23.33% had mild disability to movement of inversion. Moderate range of motion of eversion was noted for 60% of subjects. 30% had severe and 10% had severe difficulty in eversion. The ROM is decreased according to the injury at the site. Most of the injuries like ankle fracture, ligament injuries and sprains show altered or decreased range of motion. This can be assessed with goniometry. *Sthabda paadatha* is *Kriyahani* or functional disability. Any injury to ankle causing inflammation, nerve tissue damage etc can end up in this clinical condition.

Khanjatha or limping was severe 36.7% subjects as they were unable to walk without support. 33.3% had moderate limping as their heel does not completely come in contact with the floor and had stammering gait. 30% had mild limping as their heel come in contact with floor but stammering gait. In sports injuries 3 patients had mild *Khanjatha* 3 had moderate and 4 had severe *Khnajatha*. By trauma due to fall 5 each had mild and moderate *Khanjatha*, and 3 had severe. In cases reported due to road traffic accident one had mild 2 had moderate and 4 had severe *Khanjatha*. Severe *Khanjatha* was noted in patients with RTA and sports injuries among the registered patients. Ankle injuries which damage the tendons of the muscles such as flexor hallucis longus etc, lateral ligament and produce lameness or *Khanjata.*

The anatomy of the ankle joint complex determines that the biomechanics is not just that of a simple hinge joint but that of multi-axial motions occurring simultaneously to facilitate human gait. The ankle joint complex bears a force of approximately five times body weight during stance in normal walking, and up to thirteen times body weight during activities such as running[16].

The joint space was normal for 28 enrolled subjects. 1 had reduced joint space. 1 was reported with dislocation. X-ray shows mainly the injury to bones. Among the subjects 17 had structural changes in x-ray ie, a fracture or dislocation. For the rest 13 there were no changes.

100% of the subjects had the *Gulpha Marma Ahighatha Lakshana* of *Ruja, Sthabdatha* and *Khanjatha*. Any injury to ankle joint may be presented with *Gulpha Marma Abhighatha Lakshana.*

Each year, an estimated 1 million persons present to physicians with acute ankle injuries. More than 40 percent of ankle sprains have the potential to cause chronic problems.

CONCLUSION

Gulpha Marma is a *Shakha gatha Marma* located between *Paada* and *Jangha* (the foot and the leg) which is anatomically correlated with the ankle joint region. The vulnerability of the ankle joint is due to the presence of vital point, The *Gulpha Marma*. Various traumas to the ligaments, tendons and bones leads to the impairment of normal functioning of ankle joint. *Ruja, Sthabda paadatha, Khanjatha, Sopha, Asthi Vikruthi Lakshana* are observed at ankle joint as a result of several pathologies.

Gulpha Marma is a *Sandhi Marma* and if any type of trauma occurs on *Gulpha Marma Pradesha*, there is a maximum chance of joint injury and main symptom appears is *Ruja*, so it is a *Rujakara Marma*. In ankle injuries the *Gulpha Marma Abhighatha Lakshana* of *Ruja* (pain), *Sthabda Paadatha* (restricted movement) and *Khanjatha* (limping) were noted which in turn represents the biomechanical dysfunction of the ankle joint. Various injuries due to strenuous activity, falls, accidents, sports, dance etc at the *Gulpha Marma*, cause various structural defects.

Evaluation of 30 patients with ankle injuries showed *Gulpha Marma Vidha Lakshana* of *Ruja*, *Sthabdatha* and *Khanjatha*. Structural changes are evaluated by radiological examination. The alternative hypothesis is accepted rejecting the null hypothesis as there were structural and functional changes in *Gulpha Marma* is observed.

Limitations

The radiological findings by x-ray can only reveal *Asthi* and *Sandhi Abhighatha Lakshana*. The other *Marma Vasthu* like *Sira, Snayu, Mamsa* etc can only be elicited by advanced radiological techniques like MRI.

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