

PART – I

**CONCEPT OF VĀTAROGA AND IT'S MANAGEMENT WITH SPECIAL
REFERENCE TO SANDHIGATAVĀTA ACCORDING TO DIFFERENT
ĀYURVEDIC SAMHITĀS.**

PART – II

**EFFECT OF YOGA ON PAIN, MOBILITY, GAIT AND BALANCE IN
PATIENTS WITH OSTEOARTHRITIS OF KNEE**

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Transliteration codes with diacritical symbols

अ	आ	इ	ई	उ	ऊ	ऋ	ॠ
a	ā	i	ī	u	ū	ṛ	ṝ
ऌ	ए	ऐ	ओ	औ	अं	अः	
ḷ	e	ai	o	au	m̐	ḥ	
क	ख	ग	घ	ङ			
ka	kha	ga	gha	ṅa			
च	छ	ज	झ	ञ			
ca	cha	ja	jha	ña			
ट	ठ	ड	ढ	ण			
ṭa	ṭha	ḍa	ḍha	ṇa			
त	थ	द	ध	न			
ta	tha	da	dha	na			
प	फ	ब	भ	म			
pa	pha	ba	bha	ma			
य	र	ल	व				
ya	ra	la	va				
श	ष	स	ह				
śa	ṣa	sa	ha				
ळ	क्ष	त्र	ज्ञ	ॐ	।	kṣa	tra jña om

PART- I

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PART – II

EFFECT OF YOGA ON PAIN, MOBILITY, GAIT AND BALANCE IN PATIENTS WITH OSTEOARTHRITIS OF KNEE

PART- II

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ABSTRACT

Background: Osteoarthritis (OA) of the knee is the most common type of arthritis requiring pain management and affects older adults. Traditional texts describe the benefits of *yoga* for many types of arthritis. There is a need to have *yoga* better recognized by the health care community as a complement to conventional medical care.

Aims: The present study was designed to assess the impact of one week of Integrated Approach of *Yoga* Therapy on pain, mobility, gait and balance in patients with osteoarthritis of knee.

Methods and Material: Variables viz. Pain Visual Analog Scale, Timed Up & Go and Performance Oriented Mobility Assessment were evaluated in 39 patients (M-22, F-17) aged between 45 to 81 years (mean age \pm SD, 63.07 ± 9.14) at the beginning and end of a non-residential *yoga* therapy camp. The patients were examined twice: at baseline before intervention and after seven days, as follow-up. During the intervening seven days, they received Integrated Approach of *Yoga* Therapy.

Results: The data of thirty-nine patients was used for current analysis. The subjects showed significant reduction in pain ($p < 0.001$), improvement in basic mobility skills ($p < 0.001$) and stability in gait and balance. ($p < 0.001$).

Conclusions: This study suggests that Integrated Approach of *Yoga* Therapy (IAYT) is effective in reducing pain and improving the mobility, gait and balance in patients with osteoarthritis of knee.

Key words: *yoga* osteoarthritis mobility gait

CHAPTER 1 INTRODUCTION

In the science of medicine, as in all other branches of study, the ancient *Āryans* claim to have derived their knowledge from the Gods through direct revelation. *Suśruta* in his *saṁhitā* has described the *Āyurveda* as a subdivision (*upāṅga*) of the *Atharva veda*, while according to *Vyāsa*, the science of the *Āyurveda* has its origin in the verses of the Rik *saṁhitā*.

इह खल्वायुर्वेदमष्टाङ्गमुपाङ्गमथर्वेदस्यानुत्पाद्यैव पज्ञाः । सु. सू. १:६ ।

Iha khalvāyurvedamaṅgāṅgamupāṅgamatharvedasyānutpādyaiḥ prajñāḥ । Su. Sū. 1:6 ।

ऋग्वेदस्यायुर्वेद उपवेदः ।

(*Caraka vyūha* by *Vyāsa*)

Āyurveda is a holistic healing science which comprises of two words, *Āyu* and *Veda*. *Āyu* means life and *Veda* means knowledge or science. So the literal meaning of the word *Āyurveda* is the science of life. *Āyurveda* is a science dealing not only with treatment of some diseases but is a complete way of life. "*Āyurveda* treats not just the ailment but the whole person and emphasizes prevention of disease to avoid the need for cure." While making efforts to find out remedies for various diseases, scant attention is paid to the concept of positive health in modern medical research. *Āyurveda* lays a great deal of emphasis upon the preservation and promotion of positive health which is its primary objective. Prevention and cure of the diseases are only the secondary objective of *Āyurveda*.

The literature of *Āyurveda* usually divided into two groups, the major trio (brhatrayi) and the minor trio (laghutrayi). The first group comprises of the three big volumes, namely *Caraka saṁhitā*, *Suśruta saṁhitā* and *Astāṅga Hṛdaya* and the second group comprises of *Mādhava Nidāna*, *Śārangadhara saṁhitā*, and *Bhāvaprakāśa*. These six volumes form the backbone of the *Āyurvedic* literature.

CHAPTER 2 REVIEW OF *ĀYURVEDIC* LITERATURE

2.1 Historical Evolution

Sandhigatavāta as a disease entity in organized form is relatively a late entry in *Āyurvedic* literature. It was recognized as a separate disease only in late 9th cent. AD when *Mādhava kara* described the distinct etiopathogenesis and symptomatology for it and coined the term *sandhigatavāta*. Surprisingly this subject is not dealt with in The *Smṛiti* texts specially the *Manu* (Ca.400) and *Yajna Valkya* (Ca. 400-1000 A.D.) who otherwise had described many subjects of *Āyurveda*. When *sandhigatavāta* is considered as a fully identified and recognized disease entity. This is why *sandhigatavāta* is often considered as the original contribution of *Mādhava Kara* to *Āyurvedic* Literature. Historical evolution of *sandhigatavāta* can be studied under following headings.

2.2 Saṁhitā Period

In the entire period of *saṁhitā kāla* (1000 B.C. to 600 A.D.) any reference of *sandhigatavāta* as a clinical entity is not found in any of the *Āyurvedic* classics viz. *Caraka saṁhitā*, *Suśruta saṁhitā*, *Astāṅga Hṛudaya* and *Kaśyapa saṁhitā*. *Suśruta* also explored a detailed description regarding its production, clinical manifestations and treatment in this context.

2.3 Medieval period

This period began in *Āyurveda* from 900 A.D. In this period *Mādhava* (900 A.D.) first recognized the *sandhigatavāta* as a separate disease. He described its etiopathogenesis, symptomatology, classification, and also the prognosis. The treatment was not described because it was a treatise of clinical medicine, later authors described it as an independent disease along with its treatment e.g.:

<i>Cakradutta</i>	(1040 A.D.)
<i>Āraṅgadhara saṁhitā</i>	(1226 A.D.)
<i>Rasa Ratna Samuccaya</i>	(1240 A.D.)
<i>BhāvaPrakāśa</i>	(16 th cent. A.D.)
<i>Yoga Ratnākara</i>	(17 th cent. A.D.)
<i>Bhaiṅjya Ratnāvali</i>	(1800 A.D.)

2.4 Modern period

During past few years some major strides have been stepped towards a more clear genetic and immunological understanding of rheumatoid disease. The genetic association of rheumatoid disease is identified and the disease susceptibility in a part of population is now understood on genetic grounds. This has helped a lot to the knowledge of its etiopathogenesis but not much to the part of its management. A big array of medicaments ranging from many newer generations of NSAIDs, steroids and cytotoxic drugs like methotrexate have been tried, but remained unable to keep their promises for long, except for some of the transient symptomatic relives and more of the undesired effects. In such enigmatic situation, *Āyurvedic* therapeutic modalities are often opted for the management of rheumatoid disease. Much can be attributed to this outcome but it is mainly because of a modified therapeutic and research approach currently practiced, suitable to modern circumstances but at the same time, not utilizing the *Āyurvedic* fundamentals of disease management in their full dimensions. Contrary to the common practice of *Āyurvedic* therapeutics, (which largely remained with its *samśamana* aspect only) *Āyurveda* classically approaches toward a disease in many other ways. *Nidāna parivarjana* and *pathya sevana* are the main stay of *Āyurvedic* therapeutics though largely neglected during present days. Probable role of specific weather conditions as etiopathogenetic and modifying factor in rheumatoid disease is recognized very recently by the modern world.

The entire work has been presented in the dissertation under following heads.

i) Definition of *Sandhigatavāta*

Sandhigatavāta is comparatively a new clinical entity in *Āyurveda*. For the first time *Mādhava* has given its full description. After *Mādhava* all the treatise on *Āyurvedic* medicine have included the description of *sandhigatavāta roga*. *Mādhava's* description of *sandhigatavāta* is very similar to osteoarthritis (O.A.). *Doṣa* in the *Sandhishthāna* can be compared with the antibodies.

ii) Pathogenesis of *sandhigatavāta*

<i>Doṣa</i>	<i>Vāta + Kapha</i>
<i>Duṣya</i>	<i>Rasa</i>
<i>Adhiṣṭhana</i>	<i>Sandhi, Sleśmadhara Kala (Synovium)</i>
<i>Srotas</i>	<i>Rasavaha Srotas</i>
<i>Duṣṭi</i>	<i>Saṅga</i>

iii)
Symptoms of
Sandhigatavāta

W

When the disease is in full swing, it is the most dreadful disease. There is acute inflammation associated with pain in various joints of the body- in hand, feet, ankle, knee, hip and vertebral column etc. In addition, if the *Doṣa* gets localized in a specific joint-it causes agonising pain in the form of scorpion bite.

iv) Prognosis of *Sandhigatavāta* (*Sādhyāsādhyatā*)

When *sandhigatavāta* has single predominant *doṣa*, it is *Sādhyā* (curable), when two *doṣas* dominant, it is *Yāpya* (difficult to treat). When all the three *doṣas* dominant then it becomes *Asādhyā*. i.e. untreatable.

v) Principles of management of *Sandhigatavāta*

The principles of *Āyurvedic* management of *sandhigatavāta* are discussed in detail, later in the present work. Principally the management can be divided into three parts:

- a) Management of Basic pathogenesis
- b) Management of Symptoms
- c) Management of Complications.

CHAPTER 3

VĀTA-VYĀDHI

3.1 Nirukti and Vyutpatti

The term “*vāta-vyādhi*” is in a compound form. It may be interpreted in two different ways, as follows:

- a) “वात-एव-व्याधिः”

It means *vāyu* itself is the disease. By implication, the aggravated *vāyu* itself after afflicting the concerned *duṣyas* (tissue elements) pervades the entire body or a part of it to give rise to different types of pain for which the ailment is called “*vāta-vyādhi*”.

- b) “वाताद्-व्याधिः”

The disease caused by *vāyu*. By implication, other *doṣas* and the *duṣyas* (tissue elements) are vitiated in a special way by *vāyu* to produce diseases in the entire body or in a part of it which is called “*vāta-vyādhi*”.

3.2 Classifications

Diseases are broadly classified in to three categories, as follows:

- a) *Āgantū* or exogenous;
- b) *Mānasa* or psychic; and
- c) *Doṣaja* or caused by *doṣas*, viz., *vāta*, *pitta* and *kapha*.

No doubt, fever etc. are also caused by *vāyu*. But they can not be called “*vāta-vyādhi*” because there is a possibility of such diseases being caused by other *doṣas* also (without *vāyu*). Therefore, in the present context, such diseases are not to be designated as *vāta-vyādhi*.

Vāyu gets aggravated to cause a disease in two different ways, viz.,

- a) *dhātu-kṣaya* or diminution of tissue elements, and
- b) *mārga-āvaraṇa* or obstruction to its channel of circulation.(vide verse no. 59)

Diseases caused by *vāyu* are classified in to two broad categories, viz.,

- a) *Nānātmaja* or those caused by *vāyu* alone, and
- b) *Sāmānyaja* or those caused by *vāyu* in association with other *doṣas*.

Nānātmaja type of *vātic* diseases are of eight types. Treatment of *vātic* diseases of *nānātmaja* type (those invariably caused by *vāyu*) is described in detail in *Caraka samhita-cikitsā sthāna*,chapter-28.

3.3 Prognosis of the disease

It is always essential to know the natural course, rate of progression, possible outcomes and results obtained by the conventional medicine before considering a newer therapeutic modality for the management of any disease. *Āyurveda* has given due importance to this aspect of disease understanding and classified diseases according to their treatability. At the very outset *Caraka* describes two kinds of diseases according to their prognosis.

- a) *Sādhya* (Treatable) (C.Vim. 6.3)
- b) *Asādhya* (Untreatable)

Sādhya group of diseases are further classified according to their relative treatability into: a)

Mṛdu (easy to treat, presented with mild symptoms).

b) *Dūrūna* (difficult to treat, presented with severe symptoms).

3.4 Effect of Pañcakarma therapy

Pañcakarma therapies are of little use for the treatment of incurable diseases; these are effective only for the treatment of curable types of *doṣaja* diseases. In *Caraka samhita-cikitsā sthāna*, chapter-28, (vide verse nos. 221-231), ailments arising out of the occlusion of *vāyu* by *pitta* and *kapha* are also designated as *vāta-vyādhi* because such diseases are never manifested without the predominant involvement of *vāyu*.

CHAPTER 4

ETIOLOGY OF *VĀTA-VYĀDHI*

4.1 According to *Caraka sahitā*

रुक्षशीताल्पलघ्वन्नव्यवायतिप्रजागरैः ।

विषमादुपचाराच्च दोषासूक्ष्मवणादपि ॥ च. चि. २८:१५ ॥

Rukṣāśītālpaladhvannavyavāyatiprajāgaraia |

Viṣmādupacārācca doṣāsṣkṣravaṣādapi || Ca.Ci. 28:15 ||

लङ्घनप्लवनात्यध्वव्यायामादिविचेष्टितैः ।

धातुनां संक्षयाच्चिन्ताशोकरोगादिकर्षणात् ॥ च. चि. २८: १६ ॥

Laṅghanaplavanātyadhvavyāyāmādiviceṣṣitaia |

Dhātunāṣ saṣkṣayāccintāśokarogādikaṣaṣāt || Ca.Ci. 28: 16 |

वेगसन्धारणादामादभिधातादभोजनात् ॥ च. चि. २८: १७ ॥

मर्माबाधाद्गजोष्ठाश्वशीघ्रयानादिसेवनात् ।

Vegasandhāraṣādāmādabhidhātādashojanāt || Ca.Ci. 28:17 ||

Marmābādhādgajoṣṣrāśvaśighrayānādisevanāt |

देहे स्रोतांसि रिक्तानि पुरयित्वाऽनिलो बली ॥ च. चि. २८: १८ ॥

करोति विविधान् व्याधीन् सर्वाङ्गैकाङ्गसंश्रितान्।

Dehe strotā□si riktāni purayitvā'nilo balī || Ca.Ci. 28:18 ||

Karoti vividhān vyādhīn sarvā□gaikā□gasa□śritān |

Vāyu gets aggravated by the following

- 1) Intake of unctuous, cold, scanty and light food;
- 2) Excessive sexual indulgence;
- 3) Remaining awake at night in excess;
- 4) Inappropriate therapeutic measures;
- 5) Administration of therapies which cause excessive elimination of *do□as* (including stool) and blood;
- 6) Keeping fast in excess;
- 7) Swimming in excess;
- 8) Resorting to wayfaring, exercise and other physical activities in excess;
- 9) Loss of *dhātus* (tissue elements);
- 10) Excessive emaciation because of worry, grief and affliction by diseases;
- 11) Sleeping over uncomfortable beds, and sitting over uncomfortable seats;
- 12) Anger, sleep during day time, fear and suppression of natural urges;
- 13) Formation of *āma* (product of improper digestion and metabolism), suffering from trauma and abstention from food;
- 14) Injuries to marmas (vital spots in the body); and
- 15) Riding over an elephant, camel, horse or fast moving vehicles, and falling down from the seats on these animals and vehicles.

4.2 According to *Suśruta sa□hitā*

तत्रबलवद्विग्रहातिव्यायामव्यवायाध्ययनप्रपतनप्रधावनप्रपीडनाभिधातलङ्घनप्लवनतरणरात्रिजागरणभारहरणगजतुरङ्गर-

थपदातिचर्याकटुकषायतिक्तरुक्षलघुशितविर्यशुष्कशा-कवल्लूरवरकोद्दालककोरदूषश्यामाकनीवारमुद्गमसुराढ-

कीहरेणुकलायनिष्पावानशनविषमाशनाध्यशनवातमु-त्रपुरीषशुकच्छदिक्षवथूद्दारबाष्पवेगविधातादिभिर्षिशोषै-

र्वायुः प्रकोपमापद्यते ॥ सु सू १८ ॥

tatrabalavadvigrhātivyāyāmyavāyādhyayanaprapatanapradhāvanaprapī□anābhi-

dhātala□ghanaplavanatara-□arātrijāgara□abhārahara□agajatura□gara-

thapadāticaryyāka□uka□āyatiktaruk□alaghuśitaviryyaśu□kaśā-

kavallūravarakoddālakakoradū□aśyāmākanīvāramudgamasurā□ha-

kīhare□ ukalāyani□ pāvānaśanavi□ amāśanādhyāśanavātamu-
trapurī□ aśukracchadik□ avathūdrārabā□ pavegavidhātādibhir□ iśepai-
rvāyu□ prakopamāpadyate || Su Sū 18 ||

As per *Suśruta sahitā*, the bodily *Vāyu* is aggravated by such factor (conduct, practices and diet, etc.) as, wrestling with a wrestler of superior strength, violent gymnastic exercises, sexual excesses, excessive study, a headlong plunge into water or a leap from an inordinate height, running, a violent pressing blow, leaping over a ditch, a bounding gait, swimming, keeping a late hours, carrying a heavy loads, excessive riding, walking a long distance and the partaking of a food into the composition of which pungent, astringent, bitter, light or parchifying articles, or substances of cool potency, largely enter. Diets consisting of dried pot-herbs, *vallura*, *varaka*, *uddālaka*, *karaduśa*, *śyamaka*, *nivāra*, *mudga*, *masura*, *ādhāki*, *harenu*, and *niśpava* tend to aggravate the bodily *vāyu*. Fasting, unequal or irregular meals, over-eating, voluntary suppression of urine, semen and tears, or of the mucous secretion from the nose as in a fluent coryza, a forced stoppage of defecation, eructation or sneezing are the factors, which may be set down as the aggravating causes of the bodily *Vāyu*.

4.3 According to *Astāngga Hridaya*

सर्वार्थानर्थकरणे विश्वस्यासैककारणम् ।

अदुष्टदुष्टः पवनः शरीरस्य विशेषतः ॥अ ह नि १ ॥

Sarvārthānarthakaraṇe viśvasyāsaikakāraṇam ।

Aduṣṭaduṣṭaḥ pavanaḥ śarīrasya viśeṣataḥ ।' hṛ ni 1||

For all the good and bad of the world, *pavana* (*vāta*) the unvitiated (normal) and the vitiated (abnormal) respectively, is the only cause; especially so in the (human) body.

धातुक्षय करैर्वायुः कुप्यत्यतिनिष्यैवितैः ॥५ ॥

चरन् स्रोतःसु रिक्तेषु भृशं तान्येव पूरयन् ।

तेभ्योऽन्यदोषपूर्णैभ्यः प्राप्य वाऽऽवरणं बली ॥६ ॥

Dhātuḥkṣaya karairvāyuh kupyatyatiniṣyaivitaiḥ ||5||

Caran srotaḥsu rikteṣu bhṛśam tānyeva pūrayan ।

Tebhyo'nyadoṣapūrṇebhyaḥ prāpya vā"varaṇam balī ||6||

Vāyu (vāta) gets aggravated (increased) from : over-indulgence in things (foods, activities etc.) causing depletion (or loss) of tissues . *Bali (vāta)* then fills up the empty channels (because of tissue depletion) and moves greatly inside them or by getting enveloped by other *doṣas* which have filled up the channels.

4.4 According to *Mādhava Nidāna*

vṛddhavāta karma (functions of aggravated *vāta*)

अस्थिस्थः सक्थिसन्ध्यस्थिशूलं तीव्र बलक्षयम् ।

वातपूर्णद्वितिस्पर्शं शोफं सन्धिगतोऽनिलः ॥ १४ ॥

प्रसारणाकुञ्चनयोः प्रवृत्तिं च सवेदनाम् ।

सर्वाङ्गसंश्रयस्तोदभेदस्फुरणभङ्गनम् ॥ १५ ॥

स्तम्भनाक्षेपणस्वापसन्ध्याकुञ्चनकम्पनम् ।

Asthisthaḥ sakthisandhyasthiśulam tīvra balakṣayam ।

Vātapūrṇadvatisparśam śopham sandhigato'nilah ॥14॥

Prasāraṇākuñcanayoḥ pravṛtiṁ ca savedanām ।

Sarvāṅgasamśrayastodabheda sphuraṇabhañjanam ॥ 15 ॥

Stambhanākṣepaṇasvāpasandhyākuñcanakampanam ।

The aggravated *vāta* when localised in the bones, causes pain in the joints and bones, and profound loss of strength. Localised in the joints it produces swelling resembling an inflated leather bag for touch, pain at the commencement of extending and flexing movements.

CHAPTER 5
SIGNS AND SYMPTOMS OF *VĀTA-VYĀDHI*

5.1 According to *Caraka sahitā*

सङ्कोचः पर्वणां स्तम्भो भेदोऽस्थनां पर्वणामपि॥ च. चि. २८:२०॥

लोमहर्षः प्रलापश्च पणिपृष्ठशिरोग्रहः।

Sa□koca□ parva□ā□ stambho bhedo'sthanā□ parva□āmapi || Ca.Ci. 28:20 ||

Lomahar□a□ pralāpaśca pa□ip□□□haśirograha□ |

खाङ्गपाङ्गुल्यकुब्जत्वं शोषोऽङ्गानामनिद्रता ॥ च. चि. २८:२१॥

गर्भशुक्ररजोनाशः स्पन्दनं गात्रसुप्तता।

Khāñjyapā□gulyakubjatva□ śo□o'□gānāmanidratā || Ca.Ci. 28:21 ||

Garbhaśukrarajonāśa□ spandana□ gātrasuptatā |

शिरोनासाक्षिजत्रूणां ग्रीवायाश्चापि हुण्डनम्॥ च. चि. २८:२२॥

भेदस्तोदार्तिराक्षेपो मोहश्चायास एव च।

Śironāsāk□ijatrū□ā□ grīvāyāścāpi hu□□anam || Ca.Ci. 28:22 ||

Bhedastodārtirāk□epo mohaścāyāsa eva ca |

एवंविधानि रूपाणि करोति कुपितोऽनिलः ॥ च. चि. २८:२३॥

हेतुस्थानविशेषाच्च भवेद्रोगविशेषकृत्।

Eva□vidhāni rupā□i karoti kupito'nila□ || Ca.Ci. 28:23 ||

Hetusthānaviśe□ācca bhavedrogaviśe□ak□t |

Aggravation of *vāyu* gives rise to the following signs and symptoms :

- 1) Contraction, stiffness of joints and pain in the bones as well as joints;

- 2) **Horripilation, delirium and spasticity of hands, back as well as head;**
- 3) **Lameness of hands and feet, and hunch-back;**
- 4) **Atrophy of limbs, and insomnia;**
- 5) **Destruction of foetus, semen and menses;**
- 6) **Twitching sensation and numbness in the body;**
- 7) **Shrinking of the head, nose, eyes, clavicular region and neck;**
- 8) **Splitting pain, pricking pain, excruciating pain, convulsions, unconsciousness and prostration; and**
- 9) **Similar other signs and symptoms.**

The aggravated *vāyu* produces specific diseases because of the specific nature of the causative factors and the seats of manifestation. [20 ½ - ½ 24]

5.1.1 Aggravation Of *Vāyu* In The Entire Body

सर्वाङ्गकुपिते वाते गात्रस्फुरणभङ्गने॥ च. चि. २८:२५॥

वेदनाभिः परितश्च स्फुटन्तीवास्य सन्धयः।

Sarvāṅgakupite vāte gātrasphuraṅgabhāṅjane || Ca.Ci. 28:25 ||

Vedanābhiṅ paritaśca sphuṅantīvāsyā sandhayaṅ |

Aggravation of *vāyu* all over the body produces the following signs :

- (1) **Twitching sensation and breaking pain in the body;**
- (2) **Affliction of the entire body with different types of pain; and**
- (3) **A feeling as if the joints are getting cracked.**

[25 ½ - ½ 26]

5.1.2 Aggravation of *vāyu* in the bones and bone-marrow

Aggravation of *vāyu* in the bones and bone-marrow gives rise to the following signs :

- (1) **Cracking of the bones and joints;**
- (2) **Piercing pain in the joints;**
- (3) **Diminution of muscle-tissue and strength;**
- (4) **Insomnia; and**
- (5) **Constant pain.**

5.1.3 Aggravation of *vāyu* in joints

वातपूर्णदृतिस्पर्शः शोथः सन्धिगतेऽनिले।

प्रसारणाकुञ्चनयोः प्रवृत्तिश्च सवेदना ॥ च. चि. २८:३७॥

(इत्युक्तं स्थानभेदेन वायोर्लक्षणमेव च) ।

Vātapurāḍṭisparśa śoṭha sandhigate'nile |

Prasāra ākuñcanayo pravṭtiśca savedanā || Ca.Ci. 28:37 ||

(ityukta sthānabhedena vāyorlakāameva ca) |

Aggravation of *vāyu* in the joints gives rise to the following signs :

(1) Odema of the joints which, on palpation, appears as if it is a leather bag inflated with air;
and

(2) Pain while making efforts for extension and contraction of the joints.

Thus, the signs and symptoms caused by aggravated *vāyu*, on the basis of its location in different parts of the body.

5.2 According to *Suśruta sahitā*

वातेऽधिकेऽधिकं तत्र शूलस्फुरणतोदनम् ।शोफस्य रोक्ष्यकृष्णत्वश्यावतावृद्धिहानयः ॥ १२ ॥

धमन्यङ्गुलिसन्धीनां सङ्कोचोऽङ्गग्रहोतिरुक् ।

Vāte'dhike'dhikaṁ tatra śūlasphuraṇatodanam |

Śophasya roukṣyakṛṣṇatvaśyāvatāvṛddhiahānayaḥ || 12 ||

Dhamanyaṅgulisandhīnāṁ saṅkoco'ṅgagrahoatiruk |

श्वयथुर्ग्रथितः पाकी वायुः सन्ध्यस्थिमज्जसु ॥ १० ॥

छिन्दन्निव चरत्यन्तर्वक्रीकुर्वश्च वेगवान् ।करोति खञ्जं पङ्गुं वा शरीरे सर्वतश्चरन् ॥ ११ ॥

Śvayathurgrathitaḥ pākī vāyuḥ sandhyasthimajjasu || 10 ||

Chindanniva caratyantarvakraīkurmvaśca vegavān |

Karoti khañjaṁ paṅguṁ vā śarīre sarvataścaran || 11 ||

It starts first as *uttāna* type and then, in course of time, it becomes *gambhīra* type. Then swelling appears preceded by severe pain. *vāta* moving with great spread in the joints, bones and marrow produces cutting pain and curvatures (of bones and joints) and then moving all over the body make the person lame by one leg or by both the legs.

5.3 According to *Astāga Hūdaya*

जानुजङ्घोरुकट्यंसहस्तपादाङ्गसन्धिषु ।

कण्डूस्फुरणनिस्तोदभेदगौरवसुप्तताः ॥ अ ह नि १६ ६ ॥

भूत्वा भूत्वा प्रणश्यन्ति मुहुराविर्भवन्ति च ।

Jānujaṅghorukaṭyaṁsahastapādāṅgasandhiṣu ।

Kaṇḍūspḥuraṇanistodabhedagauravasuptatāḥ ॥ a hṛ ni 16 6 ॥

Bhūtvā bhūtvā praṇaśyanti muhurāvīrbhavanti ca ।

Its premonitory symptoms are throbbing, intermittent and splitting types of pain in the bony joints of the forelegs, calves, thigh, waist, shoulders, hands, feet and other joints of the body; feeling of heaviness, loss of tactile sensation- these appearing often and on.

5.4 According to *Mādhava Nidāna*

5.4.1 Prodromal features

अव्यक्तं लक्षणं तेषां पुर्वरूपमिति स्मृतम् ।

आत्मरूपं तु यद्व्यक्तमपायो लघुता पुनः ॥ मा. नि. २२:५ ॥

Avyaktaṁ lakṣaṇaṁ teṣāṁ purvarupamiti smṛutam ।

Ātmarupaṁ tu yadvyaktamapāyo laghutā punaḥ ॥ Mā. Ni. 22:5 ॥

Their prodromal stage is characterised by incomplete manifestation of the clinical features. On full manifestation, the same should be considered to be their specific clinical features. Lessening (in the severity of the clinical features) is the only criteria of cure.

5.4.2 रूप Rūpa (clinical features)

सङ्कोचः पर्वणां स्तम्भो भङ्गोऽस्थानां पर्वणामपि ।

लोमहर्षः प्रलापश्च पाणिपृष्ठाशिरोग्रहः ॥ मा. नि. २२:६ ॥

Saṅkocaḥ parvaṇāṁ stambho bhango'sthanāṁ parvaṇāmapi ।

Lomaharṣaḥ pralāpaśca paṇipṛṣṭhāśirograhaḥ ॥ Mā. Ni. 22: 6 ॥

5.4.3 Vitiated *vāyu* afflicting the joints (osteoarthritis)

हन्ति सन्धिगतः सन्धीन्छूलशोथौ करोति च ।

अस्थिशोषं च भेदं च कुर्याच्छूलं च तच्छिद्रतः ॥ मा. नि. २२:२१ ॥

Hanti sandhigataḥ sandhīnchūlaśothau karoti ca ।

Asthīśoṣaṁ ca bhedaṁ ca kuryācchūlaṁ ca tacchritaḥ ॥ Mā. Ni. 22:21 ॥

When the vitiated *vāyu* afflicts the joints, it leads to a painful swelling and ultimately destruction of joints.

CHAPTER 6
MANAGEMENT OF *VĀTA-VYĀDHI*

6.1 Line Of Treatment In General

सर्पिस्तैलवसामज्जसेकाभ्यञ्जनबस्तयः ॥ च. चि. २८:१०४ ॥

स्निग्धाः स्वेदा निवातं च स्थानं प्रावरणानि च ।

Sarpistailavasāmajjasekābhyañjanabastaya ॥ Ca.Ci. 28:104 ॥

Snigdhā ॥ svedā nivāta ॥ ca sthāna ॥ prāvara ॥ āni ca |

रसाः पर्यासि भोज्यानि स्वाद्वल्लवणानि च ॥ च. चि. २८:१०५ ॥

बृंहणं यच्च तत् सर्वं प्रशस्तं वातरोगिणाम् ।

Rasā ॥ payā ॥ si bhojyāni svādvallava ॥ āni ca ॥ Ca.Ci. 28:105 ॥

B ॥ ha ॥ a ॥ yacca tat sarva ॥ praśasta ॥ vātarogi ॥ ām |

Ghee, oil, musciefat, marrow, fomentation, massage, medicated enema, fomentation accompanied with oleation, residence in windless place, covering the body with blankets, meat-soup, different types of milk, food ingredients which are sweet, sour and saline and such other measures which are nourishing- all these are beneficial for the patient suffering from diseases caused by the aggravated *vāyu*.

6.2 According to *Caraka sahitā*

6.2 .1 Oleation Therapy

क्रियामतः परं सिद्धां वातरोगापहां शृणु ।

केवलं निरुपस्तम्भमादौ स्नेहैरुपाचरेत् ॥ च. चि. २८:७५ ॥

Kriyāmata ॥ para ॥ siddhā ॥ vātarogāpahā ॥ ś ॥ u |

Kevala ॥ nirupastambhamādausnehairupācaret ॥ Ca.Ci. 28:75 ॥

वायुं सर्पिर्वसातैलमज्जपानैर्नरं ततः ।

स्नेहक्लान्तं समाश्वस्य पयोभिः स्नेहयेत् पुनः ॥ च. चि. २८:७६ ॥

Vāyu ॥ sarpirvasātailamajjapānairnara ॥ tata ॥ |

Snehaklānta ॥ samāśvāsyapayobhi ॥ snehayet puna ॥ Ca.Ci. 28:76 ॥

युषैर्ग्राम्याम्बुजानुरसैर्वा स्नेहसंयुतैः ।

पायसैः कृशरैः साम्लवणैरनुवासनैः ॥ च. चि. २८:७७ ॥

नावनैस्तर्पणैश्चान्नैः

Yu□airgrāmyāmbujānurasairvā snehasa□yutai□ |

Pāyasai□ k□śarai□ sām̐lalava□airanuvāsanai□ || Ca.Ci. 28:77 ||

nāvanaistarpa□aiścānnai□

If the diseases is caused by *vāta* exclusively, and if no occlusion is involved, then in the beginning, the patient should be treated by oleation therapy for which *ghee*, muscle fat, oil and bone-marrow should be administered. Therafter, when the patient gets disgusted with the intake of oleation therapy, he should be consoled (rested for some time), and again oleation therapy should be administered with the help of milk, vegetable soup and soup of the meat of domesticated, aquatic and marshy-land-inhabiting animals after adding fat. He may be given *pāyasa* (preparation of rice and milk) and *k□śara* (a preparation of rice, legumes, etc.) added with sour ingredients as well as salt. He may also be given *anuvāsana* type of medicated enema, inhalation therapy and refreshing food.

6.2.2 Effects of Oleation and Fomentation Therapies

स्नेहाक्तं स्विन्नमङ्गं तु वक्रं स्तब्धमथापि वा ॥ च. चि. २८:७९ ॥

शनैर्नामयितुं शक्यं यथेष्टं शुष्कदारुवत् ।

Snehākta□ svinnama□ga□ tu vakra□ stabdhamathāpi vā || Ca.Ci. 28:79 ||

Śanairnāmayitu□ śakya□ yathe□□a□ śu□kadāruvat |

हर्षतोदरुगायामस् होथस्तम्भग्रहादयः ॥ च. चि. २८:८० ॥

स्विन्नस्याशु प्रस्याम्यन्ति मार्दवं चोपजायते ।

Har□atodarugāyāmas hothastambhagrahādaya□ || Ca.Ci. 28:80 ||

Svinnasyāśu prasyāmyanti mār̐dava□ copajāyate |

स्नेहश्च धातून्संष्कान् पुष्पात्याशु प्रयोजितः ॥ च. चि. २८:८१ ॥

बलमग्निबलं पुष्टिं प्राणांश्चाप्यभिवर्धयेत् ।

Snehaśca dhātūnsa□□kān pu□□ātyāśu prayojita□ || Ca.Ci. 28:81 ||

Balamagnibala□ pu□□i□ prā□ā□ścāpyabhivardhayet |

असकृत्तं पुनः स्नेहैः स्वेदैश्चाप्युपपादयेत् ॥ च. चि. २८:८२ ॥

तथा स्नेहमुदौ कोष्ठे न तिष्ठन्त्यनिलामयाः ।

Asak□tta□ puna□ snehai□ svedaiścāpyupapādayet || Ca.Ci. 28:82 ||

Tathā sneham□dau ko□□he na ti□□hantyanilāmayā□ |

As a dry wood can be slowly bent, as desired by the application of unctuous substance and fomentation, similarly even a curved or stiff limb can be slowly brought back to normalcy by the administration of oleation and fomentation therapies. So, tingling sensation, pricking pain, ache, contracture, oedema, stiffness, spasticity, etc., get immediately alleviated, and the body is softened by the administration of fomentation therapy. Oleation therapy, when administrated, instantaneously provides nourishment to the emaciated tissue elements. It promotes strength, *agni* (enzymes responsible for digestion and metabolism), plumpness of the body and *elan vitae*. The patient should be given oleation and fomentation therapies repeatedly as a result of which the *ko□□ha* (visceras in the abdomen and thorax) becomes soft, and the diseases of *vāyu* do not get an opportunity to get lodged there permanently. [79 ½ - ½ 83]

6.2.3 Elimination therapy

यद्यनेन सदोष्वात् कर्मणा न प्रशाम्यति ॥ च. चि. २८:८३ ॥

मूढुभिः स्नेहसंयुक्तैरौषधैस्तं विशोधयेत् ।

Yadyanena sado□tvāt karma□ā na praśāmyati || Ca.Ci. 28:83 ||

M□dubhi□ snehasa□yuktairau□adhaista□ viśodhayet |

घृतं तिल्वकासिद्धं वा सातलासिद्धमेव वा ॥ च. चि. २८:८४ ॥

पयसैरण्डतैलं वा पिबेदोषहरं शिवम् ।

Gh□ta□ tilvakāsiddha□ vā sātalāsiddhameva vā || Ca.Ci. 28:84 ||

Payasaira□□ataila□ vā pibeddo□ahara□ śivam |

स्निग्धासुलवणोष्णाद्यैराहारैर्हि मलश्चितः ॥ च. चि. २८:८५ ॥

स्रोतो बद्धवाऽनिलं रुन्ध्यात्तस्मात्तमनुलोमयेत् ।

Snigdhamlalava□o□□ādyairāhārairhi malaścita□ || Ca.Ci. 28:85 ||

Stroto baddhavā'nila□ rundhyāttasmāttamanulomayet |

दुर्बलो योऽविरेच्यः स्यात्तं निरुहैरुपाचरेत् ॥ च. चि. २८:८६ ॥

पाचनैर्दीपनीयैर्वा भोजनैस्तद्युतैर्नरम् ।

Durbalo yo'virecya□ syātta□ niruhairupācaret || Ca.Ci. 28:86 ||

Pācanairdīpanīyairvā bhojanaistadyutairnaram |

संशुद्धस्योत्थिते चाग्नौ स्नेहस्वेदौ पुनर्हितौ ॥ च. चि. २८:८७ ॥

स्वाद्वसुलवणस्निग्धैराहारैः सततं पुनः ।

Saśuddhasyotthite cāgnau snehasvedau punarhitau || Ca.Ci. 28:87 ||

Svādvamlalavaśnigdhairāhāraiśatataśpunaś |

नावनैर्धूमपानैश्च सर्वानेवोपपादयेत् ॥ ८८ ॥

इति सामान्यतः प्रोक्तं वातरोगचिकित्सितम् ।

Nāvanairdhūmapānaiśca sarvānevopapādayet || Ca.Ci. 28:88||

Iti sāmānyataśproktaśvātarogacikitsitam |

If because of inappropriate administration of [the above mentioned] therapies (oleation and fomentation) the ailments (caused by *vāyu*) do not subside, then the patient should be given elimination therapy with the help of mild drugs added with unctuous ingredients. For this purpose, the patient should take medicated *ghee* prepared by boiling, either with *tilvaka* or *saatalaa* or he may take castor oil with milk. They help in the elimination of morbid material, and produce beneficial effects.

On account of the intake of food which is unctuous, sour, saline, hot, etc., the morbid material gets accumulated and it obstructs the channels of circulation leading to the occlusion of the movement of *vāyu*. Therefore, the patient should be given elimination (purgation) therapy. If the patient is weak, and is therefore, unsuitable for the administration of purgation therapy, then he should be given *nirūha* type of medicated enema prepared with ingredients which are *pācana* (carminative) and *dīpana* (stimulant of digestion). He should also be given food added with ingredients which are *pācana* (carminative) and *dīpana* (digestive stimulants).

After the body is cleansed of morbidities as a result of which there is stimulation of agni (enzymes), it is beneficial to administer oleation and fomentation therapies again. In addition, all the patients suffering from diseases caused by *vāyu* should be continuously given diet containing ingredients which are sweet, sour, saline and unctuous. All of them should also be treated with inhalation and smoking therapies. Thus, the treatment of diseases caused by *vāyu* in general is described by *caraka*.

6.2.4 Hot poultice

एतैरेवोपनाहांश्च पिशितैः संप्रकल्पयेत् ॥ च. चि. २८:१०८ ॥

घृततैलयुतैः साम्लैः क्षुण्णस्विन्नैरनस्थिभिः ।

Etairévopanáhāśca piśitaiśsaśprakalpayet || Ca.Ci. 28:108 ||

Ghātatailayutaiśsāmlaiśkūuśśasvinnairanasthibhiś |

The above mentioned types of meat (vide vrse no. 107) should be made free from bones, cut in to small pieces, steam boiled and added with ghee, oil, and sour ingredients. These recipes should be applied in the form of hot poultice [for the cure of the diseases caused by *vāyu*].

6.2.5 Medicated bath

पत्रोत्काथपयस्तैलद्रोण्यः स्युरवगाहने ॥ च. चि. २८:१०९॥

Patrotkvāthapayastailadroṣyaṣ syuravagāhane || Ca.Ci. 28:109 ||

The patient suffering from diseases caused by the *vāyu* should take bath in a bath-tub filled with the decoction of *vāyu*- alleviating leaves, milk and oil.

6.2.6 Affusion

स्वभ्यक्तानां प्रशस्यन्ते सेकाश्चानिलरोगिणाम् ॥ च. चि. २८:१०९॥

Svabhyaktānāṣ praśasyante sekāścānilarogiṣām || Ca.Ci. 28:115 ||

For the patient suffering from *vātika* diseases affusion after proper oleation is useful.

6.2 .7 Pradeha and upanāha

फलानां तैलयोनीनामम्लपिष्टान् सुशीतलान् ।

प्रदेहानुपनाहांश्च गन्धैर्वातहरैरपि ॥ च. चि. २८:११७॥

पायसैः कृशरैश्चैव कारयेत् स्नेहसंयुतैः ।

Phalānāṣ tailayonīnāmamlapiṣṣān suśītalān |

Pradehānupanāhāṣca gandhairvātaharairapi || Ca.Ci. 28:117 ||

Pāyasaiṣ kṣaraiścaiva kārayet snehasaṣyutaiṣ |

Oil bearing fruits (seeds) should be made to a paste by tritulating them its sour ingredients, and be allowed to cool down [before application]. This paste should be applied in the form of *pradeha* (thick poultice).

Aromatic drugs having *vāyu*-alleviating property (like *aguru*, etc.), milk pudding and *kṣāra* (a preparation of rice and pulses) should be added with fat, and applied in the form of *upanāha* (thick poultice).

6.3 According to *Suśruta sahitā*

6.3.1 Medicinal preparations

चित्रकेन्द्रयवे पाग कटुकाऽतिविषाऽभया ।

वातव्याधिप्रशमनो योगः षड्धरणः स्मृतः ॥ सु. चि. ४:४ ॥

Citrakendrayave pāga kaṭukā'tiviā'bhayā |

Vātavyādhipraśamano yogaḥ ṣaḍdharaṇaḥ smṛtaḥ || Su. Ci. 4:4 ||

पक्काशयगते चापि देयं स्नेहविरचनम् ।

वस्तयः शोधनीयाश्च प्राशाश्च लवणोत्तराः ॥ सु. चि. ४:५ ॥

Pakkāśayagate cāpi deyaṁ snehavirecanam |

Vastayaḥ śodhanīyāśca prāśāśca lavaṇottarāḥ || Su. Ci. 5 ||

कार्ये वस्तिमते चपि विधिर्वस्तिविशोधनः ।

श्रीत्रादिषु प्रकृपिते कार्यश्चानिलहा क्रमः ॥ सु. चि. ४:६ ॥

Kārye vastimate capi vidhirvastiviśodhanaḥ |

Śrītrādiḥu prakṛpīte kāryāścānilahā kramaḥ || Su. Ci. 6 ||

स्नेहाभ्यङ्गोपनाहाश्च मदनालेपनानि च ।

त्वङ्मांसासृक्सिराप्राप्ते कुर्याच्चसृग्विमोक्षणम् ॥ सु. चि. ४:७ ॥

Snehābhyaṅgopanāhāśch madanālepanāni ca |

Tvaṅmāṅsāsṛkṣirāprāpte kuryāccāsṛgvimokṣaṇam || Su. Ci. 7 ||

स्नेहोपनाहाग्निमकर्मबन्धनोन्मर्दनानि च ।

स्नायुसन्ध्यस्थिसंप्राप्ते कुर्याद्वायावतन्द्रितः ॥ सु. चि. ४:८ ॥

Snehopanāhā gnimakarmabandhanonmardanāni ca |

Snāyusandhyāsthisaṅprāpte kuryādvāyāvatandritaḥ || Su. Ci. 8 ||

निरुद्धेऽस्थनि वा वायौ पाणिमन्थेन दारिते ।

नाडीं दत्त्वाऽस्थनि भिषक् चूषयेत्पवनं बली ॥ सु. चि. ४:९ ॥

Niruddhe'sthani vā vāyau pāṇimanthena dārite |

Nāḍīṅ dattvā'sthani bhivak cūṣayētpavanaṁ balī || Su. Ci. 9 ||

Similarly, application of fatty matters (*sneha*), actual cauterization, and massage, application of poultices and binding of ligatures should be the remedies where the aggravated *vāyu* would be found to have become involved in the *snāyu* (ligaments), joints and bones. Where the aggravated *vāyu* would be found to have become situated in the bone, the skin and flesh of that part of the body should be perforated with a proper surgical instrument (*Āra-Sāstra*) and

the underlying bone should be similarly treated with an awl. A tube open at both ends should be inserted into the aperture, thus made, and a strong physician should suck the aggravated *vāyu* from out of the affected bone by applying his mouth to the exterior open end of the tube.

6.3.2 *Salvana-Upanāha*

A poultice composed of the drugs of the *Kakolyādi* group, the *vāyu* -sub-during drugs (those of *Bhadra-dravādi* and *Vidarigandhādi* groups), and all kinds of acid articles+(such as, *Kanjika*, *Sauvira*, fermented rice-gruel, etc.), the flesh of animals which live in swamps (*Anupa*) or in water (*Audaka*)+, oil, clarified butter and all kinds of lardaceous substances, mixed together and saturated with a profuse quantity of salt and then slightly heated is known by the name of *Salvana*. A person suffering from any form of *vāyu roga* should be always treated with such *Salavana* poultices (*Upanāha*). The poultice should be applied to such part of the body as is numbed, painful or contracted and the affected part should be firmly bandaged thereafter with a piece of *Kashuma** linen (r woolen cloth. As an alternative, the affected part should be plastered (and well rubbed) with the ingredients of the *Salavana –Upanāha* and inserted into a bag made of ca or mongoose skin or that of a camel or deer hide.

6.3.3 Treatment of *vātavyādhi* as per locations

गाढं पट्टैर्निबन्धीयात् क्षौमकार्पासिकौर्णिकैः ।

बिडालनकुलोन्द्राणां चर्मगोण्यां मृगस्य वा ॥

प्रवेशथेद्वा स्वभ्यक्तं शाल्वणोनोपनाहितम् ॥ सु. चि १७ ॥

Gāha pa airnibadhnīyāt k aumakārpāsikaur ikai |

Bi ālanalondrā ā carmago yā m gasya vā ||

Praveśathedvā svabhyakta śālva onopanāhitam || Su. Ci. 17 ||

स्कन्धवक्षस्त्रिकप्राप्तं वायुं मन्यागतं तथा ॥ सु. चि १८ ॥

वमनं हन्ति नस्यं च कुशलेन प्रयोजितम् ।

Skandhavak astrikaprāpta vāyu manyāgata tathā || Su. Ci. 18 ||

Vamana hanti nasya ca kuśalena prayojitam |

शिरोगतं शिरोवस्तिर्हन्ति वाऽसृग्विमिक्षणम् ॥

श्लेहं मात्रासहस्रं तु धारयेत्तत्र योगतः ॥ सु. चि १९ ॥

Śirogata śirovastirhanti vā's gvimīk a am ||

Sneha □ mātrāsahastra □ tu dhārayettatra yogata □ || Su. Ci. 19 ||

The aggravated *vāyu*, if located in the shoulders, the chest, the sacrum (*Trika*) or the *manyā*, should be subdued by emetics and ermines judiciously employed. *Śiro-vasti* should be applied to the head of the patient as long as it would take one to utter a thousand *matrās* (a short vowel sound), more or less, as the case may require, where the aggravated *vāyu* would be found to have located itself in the head, (if necessary) blood-letting should be resorted to. As a mountain is capable of obstructing the passage of the wind, so the *sneha-vasti* (oily enema) is alone capable of resisting the action of the aggravated *vāyu* whether it extends throughout the whole system or is confined to a single part.

6.4 Measures beneficial to *vātavyādhi*

An application of *Sneha*, fomentations, anointment of the body, *Vasti*, oily purgatives, *Siro-vasti*, the rubbing of oils on the head, oily fumigation, gargling with tepid oil, oily errhines, the use of meat-soup, milk, meat, clarified butter, oil and other lardaceous articles (of food), all kinds of acid fruits, salt, lukewarm washes, gentle massage, the use of saffron, *Agura*, *Patra*, *Kushtha*, *Ela*, *Tagara*, the wearing of woolen, silken, cotton or any other thick kind of garments, living in a warm room or in one not exposed to the wind or in an inner chamber, the use of a soft bed, basking in the glare of fire, entire sexual abstinence, these and such like other things should be generally adopted by a patient suffering from *vāta-roga*.

CHAPTER 7
ROLE OF DIET IN *VĀTA-VYĀDHI*

7.1 Present considerations

In *Āyurveda*, diet as an etiological factor to *vātavyādhi* was a fact realized at the very outset with the description of *sandhigatavāta* but remained a neglected subject till last decade by the modern people. Speculations about the use of diet in physicians have been hesitant in tackling this complex and subjective topic. This reluctance has let the subject open to organizations and individuals offering advise with little scientific basis. But during recent years of a wake of due consideration for food as a possible etiological factor for *vātavyādhi* came into being. Food is found the greatest source of antigens exposure to human body (Sampson HA, 1987)¹. A variety of foods have been implicated in food intolerance. A list of food allergens with their allergogenic capacity is presented in the following table:

Table 1: foods associated with intolerance*

Sl. No	Food	Reported Intolerance (% of cases)
1	Milk	25
2	Egg	22
3	Nuts/Peanuts	12
4	Fish/Shell fish	12
5	Wheat/Flour	6
6	Chocolate	5
7	Artificial color	3
8	Pork/Bacon	3
9	Chicken	3
10	Tomato	3
11	Soft fruit	3
12	Cheese	3

*From Truswell A.S., 1986 ABC of Nutrition².

It is worth mentioning here that 68% of these allergens belong to animal source of food are where as rest 32% from the plant origin. There is ample evidence that allergen pass through

the epithelium of the gastro intestinal tract, interact with the mucosal immune system and gain access to the circulation (Walker W.A., 1974)³. It is known whether it is owing to the disease itself, to abnormal microbiological colonization, or to commonly used NSAIDs (Jenkins R.T. et al., 1987)⁴. During various individual and group studies various facts about the relation of food with OA were identified. One study reported objective improvement in classical OA patients after fasting for 7-10 days which then further relapsed after start of lacto vegetarian diet (Skoldstam L, 1979)⁵. Clinical improvements after dietary restrictions with corn (Williams R., 1981)⁶ and with dairy products (Parke, 1981)⁷ are also reported in single individuals.

Up to here now most studies were based upon dietary elimination i.e. elimination of certain food in the diet and then replacement is made with the same item and the results were recorded. With this method it was unusually difficult to establish multiple food allergies in a given patient. To overcome this problem a diet additions study was done, which was consisting of diet additions after a period of washout. This method was cumbersome but with the advantage of immediate identification of the responder. This study suggested that individual susceptibility which was earlier considered as *satmyatā asatmyatā* in *Āyurveda* (may be individual allergy or unusual immune response) as important factor associated with pathogenesis of OA (Beri & Malviya 1988)⁸.

Thus this can be said that shifting from omnivorous diet to vegetarian diet or restriction of animal products from diet results in clinical improvements in *vātavyādhi*. *Āyurveda* here specifies this contraindication restricted to the flesh derived from the creatures belonging to the *Ānupa deśa* (Bh. Rat. 29.237). *Āyurveda* classifies the *deśa* or the habitat in three categories on the basis of geographical and ecological characterizations (*As.San.Su* 18.29-31).

These *deśa* are :

1. *Ānupa*, 2. *Jangala*, 3. *Sādhārana*

Ānupa deśa is characterized by prevalence of fresh water resources and dense vegetations whereas the *Jangala deśa* is characterized by prevalence of hard/saline water resources, plateaus and sparse vegetations (*As. Sang. Su.* 18.29-31). These *deśa* are also characterized by

predominance of *kapha doṣa* with *madhura, amla* and synthesis of *Āma* and thus is specially contraindicated for them.

7.2 Effect of weight loss

Weight loss associated with exclusion diets is also attributed for the clinical improvements in OA (Skoldstam L., 1986)⁹. A shifting from non-vegetarian diet to vegetarian diet not only reduces the amount of allergens in the diet but also the substantial amount of fat and protein from the diet. This causes a depletion of fat depots for the energy requirements of body and thus leads to weight loss.

7.3 Ancient considerations

दिह्याच्च लवणागारधूमैस्तैलसमन्वितैः ।

पञ्चमुलीश्रुतं क्षीरं फलाह्नो रस एव च ॥ सु. चि १३ ॥

Dihyācca lavaṅgāradhūmaistailasamanvitaiṅ |

Pañcamulīśṅtaṅ kṅīraṅ phalāhṅlo rasa eva ca || Su. Ci. 13 ||

सुस्निग्धो धान्ययूषो वा हितो वातविकारिणाम्।

काकोल्यादिः सवातघ्नः सर्वाह्लद्रव्यसंयुतः ॥ सु. चि १४ ॥

Susnigdho dhānyayūṅo vā hito vātavikāriṅām |

Kākolyādiṅ savātaghnaṅ sarvāhṅladravayasaṅyutaṅ || Su. Ci. 14 ||

भोजनेषु; शालिषष्टिकयवगोधूमान्नमनवं भुञ्जीत पयसा जाङ्गलरसेन वा मुद्गयूषेण वाऽनह्नेन; ॥ सु. चि। ५:१२ ॥

Bhojaneṅu; śāliṅaṅṅikayavagodhūmānṅnamanavaṅ bhuñjīta payasā Jāṅgalarasena vā mudgayūṅeṅa vā'namlena; || Su. Ci 5:12 ||

सानूपौदकमांसस्तु सर्वस्नेहसमन्वितः ।

सुखोष्णः स्पष्टलवणः शाल्वणः परिकीर्तितः ॥ सु. चि १५ ॥

Sānūpaudakamāṅsastu sarvasnehasamanvitaṅ |

Suṅoṅṅaṅ spaṅṅalavaṅaṅ śālvaṅaṅ parikīṅtitaṅ || Su. Ci. 15 ||

In the event of the aggravated *vāyu* being connected either with the *Pitta* or the *Kapha*, such a course of treatment should be adopted as would not be hostile to the two other *Doṣas*.

Blood-letting (in small quantities) should be resorted to several times in a case of complete anesthesia (*Supta-Vāta*) and the body should be anointed with oil mixed with salt and chamber-dust (*Agāra-dhūma*). Milk boiled with a decoction of the drugs of the *Pañcamula* group, acid-fruits (*phalāmla*), meat-soup or soup of (well-cooked) corn (*Dhānya*) with clarified butter are beneficial in cases of *vāta roga*.

CHAPTER 8

ROLE OF STRESS IN *VĀTA-VYĀDHI*

Some diseases, like acute infections, have almost entirely physical causes and can be treated purely on a physical level. However, most diseases have psychological effects. Physical disease disturbs the emotions and weakens the senses, which may give rise to psychological disturbances like that psychological imbalances have physical consequences. They lead to dietary indiscretions, strain the heart and nerves, and weaken the physical body. *Āyurveda* do emphasize on the effect of stress in the pathogenesis of *sandhigatavāta*

Alasya (lethargy), *Utsāha hāni* (loss of vigour) and *Nidrā Viparyaya* (sleep disturbances) are main psychological feature of *sandhigatavāta*. These symptoms are usually generated because of *cittāvasāda* (depression) which is frequently encountered in *sandhigatavāta*. A combination of pain, stiffness, disability and social restrictions results in significantly increased level of depressed mood in OA (Newmann S.et.al.(1989)¹⁰). This mood status further modifies the perceptibility of pain, and disability in OA patient. The person in depressed mood often experiences more pain and disability than others.

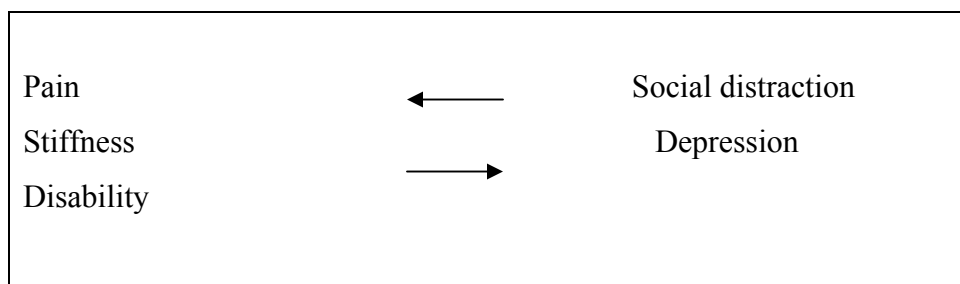


Fig.1 – interdependence of mood status and the perception of symptoms

In *Āyurveda* the psychological component of *sandhigatavāta* is well recognized. Identification of *Satva* of *sandhigatavāta* patient is very important in this context. *Satva* is described as degree of relative tolerance of pain and is categorized as *Pravara* (high), *Madhyama* (medium) and *Avara* (low). A patient of *Avara satva* experience more pain and disability even when there is no clinical evidence of severity of disease. On the other hand *Pravara satva* experiences lower degree of pain even in the presence of severe disease.

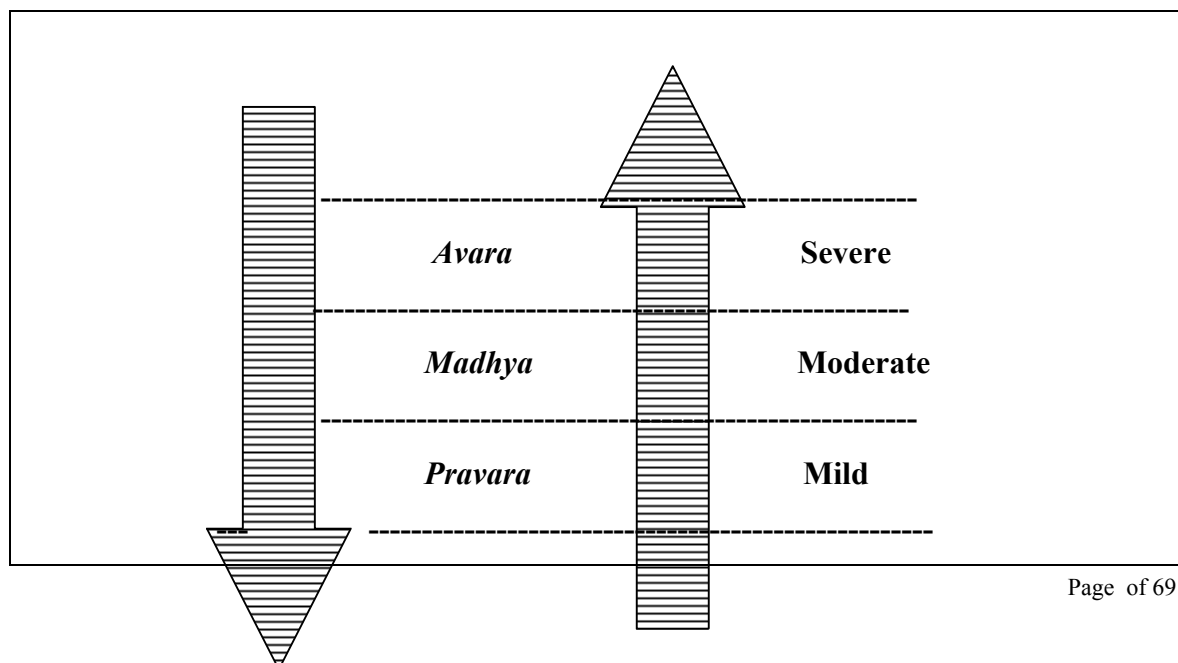




Fig 2: Inverse relationship of stava and feeling of pain (Ca. Vim. 8.119) (Fig 2).

Psychological modification of pain perception was also recognized in *Yoga Darśana* where *Dukha* is defined as the pain which is unpleasant (*Pratikula Vedaniyam Dukham*) (*Pātanjali Yogadarśana*). It clearly emphasizes the existence of pain which is likened, does not causes *dukha* or stress to the body.

Present definition of pain also reflects the similar understanding. It is defined as an unpleasant sensory or emotional experience associated with actual or potential damage (International association for the study of pain, 1979). IASP recognized the pain as a subjective emotional response which is determined by present psychological state, anticipation and past experience of tissue damage ¹¹. *Satvavajaya Cikitsa* (psycho therapy) may be helpful in this regard (Newman S., 1993)¹².

CHAPTER 9

SUMMARY AND CONCLUSION

Present work is a modest attempt to prove scientifically into the principles of *Āyurvedic* management of *vātaroga*. It is felt that a lot of work remains to be done to evolve a suitable, feasible and substantially beneficial therapeutic regimen of *Āyurveda* on scientific line for this otherwise insurmountable disease, though it is hoped that the present work will provide a lead to generate a cascade of further research works in this regard and so a truly scientific and substantial management strategy could shortly be arrived against this dreadedcripler of mankind.

Modern medical research has made a phenomenal progress during the last few decades. But instead of multi-faceted and multi-dimensional approach, it seems to be approaching the problem mainly through one direction. Specialization in the diseases afflicting different parts/organs of the body is increasing as a result of which the individual as a whole is losing his or her identity. *Āyurveda* considers different parts/organs of the body as physiologically interconnected. Therefore, in addition to the afflicted part or organ, the entire body is examined, and the individual as a whole is treated.

Modern medical science is mostly confined to the physique, while the layer of psyche is receiving scant attention. *Āyurveda*, on the other hand, emphasizes upon the psychosomatic concept of the disease. The mind is closely related to the body and vice versa. In addition, the three remaining levels are examined by the *Āyurvedic* physicians which are almost neglected in modern medical research.

Death is eternal truth and no body has escaped it. But before death, miseries could be reduced or even avoided.

पश्येम शरदः शतम् जीवेम शरदः शतम् श्रुणुयाम शरदः शतम् प्रब्रवाम शरदः शतम् शतमदीनाः स्याम शरदः शतम् भूयश्च शरदः शतात् ॥
(यजुर्वेद 36:24)

O Almighty ! Let us see for one hundred autumns (years), let us live for one hundred autumns (years), let us serve the society for one hundred autumns (years), make us free from miseries for one hundred autumns (years), and for more than one hundred autumns (years). Observance of the health rules prescribed in *Āyurveda* will go a long way in making the society free from physical, mental and spiritual ailments.

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CHAPTER 1

INTRODUCTION

Osteoarthritis (OA) of the knee is a common chronic degenerative disorder¹. It is a disorder of cartilage that affects almost 85% of the population by the age of 75². Preventable or modifiable risk factors include obesity, occupational factors, sports participation, muscle weakness, nutritional factors and hormonal influence³. Early diagnosis and, education and acceptance of home based exercises may prevent or at least delay disability⁴ and help to reduce psychosocial complications and financial burden of chronic pain syndrome⁵.

Basic treatment consists of teaching patients about their disease, alleviating pain and preserving joint function². Non-pharmacologic treatments is a part of all guidelines for treatment of osteoarthritis (OA) and consist of exercises, electrotherapy/thermotherapy, application of orthotic devices and braces, changes in life style (reduction of body weight, adherence to exercises, adaptations in home or work environment), education and psychosocial support⁴. Rest and cold applications as well as diet modification can also play a role in chronic disease management⁶. Alternative therapies such as yoga, acupuncture, biofeedback, massage, relaxation techniques, exercise, physical therapy and psycho-counseling also diminish pain and improve outcome in patients with OA of knee.

Quadriceps weakness is another risk factor for incident of osteoarthritis of knee⁸. Multimodal physiotherapy program including taping, exercises and massage is effective for knee osteoarthritis⁹. Also aquatic physical therapy results in significantly less pain and improved physical function, strength and quality of life in the management of patients with hip and knee osteoarthritis¹⁰. Some complementary or alternative therapies, like acupuncture, homeopathy, magnet therapy, tai chi, leech therapy, music therapy, yoga, imagery and therapeutic touch have generated sufficiently promising results in osteoarthritis¹¹. It has been observed that, increased practice of psychological procedures such as biofeedback, progressive muscle training and relaxation tape home practice is inversely related to decreased pain in osteoarthritis and is potentially effective in osteoarthritis pain management¹². Guided imagery with progressive muscle relaxation reduces chronic pain and mobility related difficulties¹³.

Life-style modification, particularly exercise and weight reduction, is a core component of the management of osteoarthritis^{14,15}. There are various treatment modalities. Balneotherapy and mud-pack therapy were effective in treating patients¹. Traditional spa therapies are sometimes considered good in

treatment of functional status and pain in patients with OA¹⁶. Yoga provides a feasible treatment option for previously yoga-naive, obese patients above 50 years of age and offers potential reductions in pain and disability caused by knee OA¹⁷. Over the last 10 years, a growing number of research studies have shown that the practice of Hatha Yoga can improve strength and flexibility, and may help to control such physiological variables as blood pressure, respiration and heart rate, and metabolic rate to improve overall exercise capacity¹⁸. Two limited studies of yoga in osteoarthritis of the hands and carpal tunnel syndrome show greater improvement in pain than in control groups⁶. Significant improvement in pain have been observed during activity, tenderness, strength, motion, joint circumference, tenderness, hand function and finger range of motion¹⁹. Osteoarthritis (OA) of knee affects many older people and may result in pain and loss of function in the knee²⁰.

Although there is a dearth of literature in lay press on the value of using non-pharmacological modalities in pain outcomes in osteoarthritis of knee, there is little research establishing the efficacy of alternative therapies such as yoga. The aim of this study was to assess the feasibility of using yoga to treat the symptoms of osteoarthritis of knee. This study highlights recent important research, future directions and clinical applications of yoga in treating osteoarthritis of knee. It focuses on knee osteoarthritis because of its prevalence and the dearth of research involving other joint osteoarthritis. We hypothesize that yoga interventions would help in improving the mobility, gait and balance and in reducing pain in patients with osteoarthritis of knee.

CHAPTER 2

AIM AND OBJECTIVES

2.1. Aim

To evaluate the effect of one week of Integrated Approach of *Yoga* Therapy in patients with osteoarthritis of knee in a non-residential set up.

2.2. Objectives

To identify the changes in mobility, gait and balance associated with *Yoga* therapy in people suffering from osteoarthritis of knee who were not practicing *yoga* earlier and to discuss the basis for these changes associated with the practice of *yoga* and to identify the possible conditions in which this *yoga* therapy may be recommended based on the findings.

2.3. Scope

There is a growing awareness amongst the Indians about short-term yoga camps, which are popularized through the media. Although there is very impressive anecdotal single case reports used in publicity apart from a pilot study that has shown decreased pain after yoga, there are, there are very few scientific studies on the efficacy of short-term yoga camps. Hence the present study was planned on a yoga camp in Patna city, Bihar, to scientifically evaluate the effect of yoga intervention on OA knees. Since, the study is planned in an outpatient yoga therapy camp, very few simple outcome measures have been included. The results of this study if encouraging, could pave way for future randomized controlled studies. The results of this study would also encourage large sections of Indian population to adopt yoga for prevention and treatment of osteoarthritis of knee.

CHAPTER 3

REVIEW OF LITERATURE

3.1 Studies on yoga and relaxation techniques in osteoarthritis

A pilot study was done to assess the feasibility of using yoga in the tradition of B.K.S. Iyengar to treat the symptoms of osteoarthritis of the knee. Participants were instructed in modified Iyengar yoga postures during 90-minute classes once weekly for 8 weeks. Eleven (11) subjects enrolled, nine completed at least one session and seven (six of whom were obese) had data from pre- and post-course time points available for analysis. Statistically significant reductions in Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) pain, WOMAC Physical Function, and Arthritis Impact Measurement Scale (AIMS)2 were observed when participants' status were compared to their pre-course status. A trend of improvement was found in WOMAC Stiffness, AIMS2 Symptoms which suggested that yoga provides a feasible treatment option for previously yoga-naive, obese patients >50 years of age and offers potential reductions in pain and disability caused by knee OA¹⁷.

Another study was conducted with an objective to collect controlled observations of the effect of yoga on the hands of patients with osteoarthritis (OA), in which patients with OA of the hands were randomly assigned to receive either the yoga program or no therapy. Yoga techniques were supervised by one instructor once/week for 8 weeks. Variables assessed were pain, strength, motion, joint circumference, tenderness, and hand function using the Stanford Hand Assessment questionnaire. The yoga treated group improved significantly more than the control group in pain during activity, tenderness and finger range of motion. This yoga-derived program was effective in providing relief in hand OA¹⁹.

A study reviewed the evidence for mind-body therapies (eg, relaxation, meditation, imagery, cognitive-behavioral therapy) in the treatment of pain-related medical conditions. Based on evidence from randomized controlled trials and in many cases, systematic reviews of the literature, the following recommendations were made: 1) multi-component mind-body approaches that include some combination of stress management, coping skills training, cognitive restructuring and relaxation therapy may be an appropriate adjunctive treatment for chronic lower back pain; 2) multimodal mind-body approaches such as cognitive-behavioral therapy, particularly when combined with an educational/informational component, can be an effective adjunct in the management of rheumatoid and osteoarthritis; 3) relaxation and thermal biofeedback may be considered as a treatment for recurrent migraine, while relaxation and muscle biofeedback can be an effective adjunct or stand alone

therapy for recurrent tension headache; 4) an array of mind-body therapies (eg, imagery, hypnosis, relaxation) when employed pre-surgically, can improve recovery time and reduce pain following surgical procedures; 5) mind-body approaches may be considered as adjunctive therapies to help ameliorate pain during invasive medical procedures²¹.

3.2 Studies on life-style modification in osteoarthritis

Reviewed evidences for the efficacy of exercise, weight reduction and change to special footwear, it was highlighted that long-term adherence to exercise, weight reduction and life-style modification is a core component of the management of osteoarthritis¹⁵.

A study was done to examine the effect of a self-management program on physical function and quality of life of women with knee osteoarthritis. Seventeen subjects in the control group received no intervention and 18 subjects for experimental group received an individual self-management program which consisted of dietary education and home-based exercise; walking and resistance exercise. The result showed significant increase in physical function. In addition, there was significant increase in quality of life and significant interaction effects in the intervention group. The study concluded that a self-management program can be used as an efficient nursing intervention for women with knee osteoarthritis¹⁴.

In a study, physical function and body composition in older obese adults with knee osteoarthritis (OA) were examined after intensive weight loss. Body composition and physical function (WOMAC, 6-minute walking distance, and stair climb time) were assessed at baseline and 6 months. Body weight decreased in weight loss (WL). Body fat and fat-free mass was lower for WL than weight stable (WS) cases at 6 months. WL had better function than WS, with lower Western Ontario and McMaster University Osteoarthritis Index scores, greater 6-minute walk distance, and faster stair climb time. Changes in function were associated with weight loss in the entire cohort. An intensive weight loss intervention incorporating energy deficit diet and exercise training improves physical function in older obese adults with knee OA. Greater improvements in function were observed in those with the most weight loss²².

3.3 Studies on naturopathy in osteoarthritis

A study was done to compare the effects of two types of balneotherapy in patients with knee osteoarthritis (OA). The patients were divided into two groups: group I (n=30) received a spa treatment and a mud pack per day, group II (n=28) received only two spa treatments per day. The effects of two traditional spa therapies were evaluated using Lequesne index. Secondary measures were pain intensity (visual analogue scale), 10 meters walking time, 3 squats and 10 stairs climbing time. The results of secondary measures show a better improvement in the first, in regard to the second group. Both traditional spa therapies are good in treatment of functional status and pain in patients with OA¹.

3.4 Studies on acupuncture in osteoarthritis

Another study was done to evaluate the evidence for the effectiveness of acupuncture in peripheral joint osteoarthritis. All randomized controlled trials (RCTs) of acupuncture for patients with peripheral joint OA were considered for inclusion. Overall, ten studies demonstrated greater pain reduction in acupuncture groups compared with controls. The meta-analysis of homogeneous data showed a significant effect of manual acupuncture compared with sham acupuncture which was supported by data for knee OA. Considering its favorable safety profile acupuncture seems an option worthy of consideration particularly for knee OA.²⁰

A study was done to evaluate the effects of standardized western acupuncture and physiotherapy on pain and functional ability in patients with severe osteoarthritic knee pain awaiting knee arthroplasty. Main outcome measures were Oxford Knee Score questionnaire (OKS) (primary); 50 m timed walk and duration of hospital stay following knee arthroplasty. The results showed there was a reduction in OKS in the acupuncture group at 7 weeks, which was a significant difference between the acupuncture and the control group. These effects were no longer present at 12 weeks. The study demonstrated that patients with severe knee osteoarthritis can achieve a short-term reduction in OKS when treated with acupuncture²³.

3.5 Studies on physiotherapy in osteoarthritis

A randomized, double blind, placebo controlled trial on 140 community volunteers with knee osteoarthritis concluded that multimodal physiotherapy program including taping, exercises, and massage is effective for knee osteoarthritis. Physiotherapy and placebo interventions were applied by 10 physiotherapists in private practices for 12 weeks. Physiotherapy included exercise, massage,

taping, and mobilization, followed by 12 weeks of self-management. Primary outcomes were pain measured by visual analogue scale and patient global change. Secondary measures included WOMAC, knee pain scale, and assessment of quality of life index, quadriceps strength, and balance test. Both groups showed similar pain reductions at 12 weeks and at 24 weeks from baseline in both groups. Similarly, global improvement was also reported⁷.

A randomized, controlled trial of massage therapy for OA of the knee was done to prove its efficacy. Sixty-eight adults with radiographically confirmed OA of the knee were assigned either to treatment (Swedish massage) or to control (delayed intervention). Primary outcomes were changes in the WOMAC pain and functional scores and the visual analog scale of pain assessment. The group receiving massage therapy demonstrated significant improvements in the mean (SD) WOMAC global scores, pain, stiffness, and physical function domains and in the visual analog scale of pain assessment, range of motion in degrees, and time to walk 50 ft (15 m) in seconds. Findings were unchanged in multivariable models controlling for demographic factors. Massage therapy is efficacious in the treatment of OA of the knee²⁴.

3.6 Studies on aquatic physical therapy in osteoarthritis

Another study was done to evaluate the effects of aquatic physical therapy on hip or knee OA. The study was designed as a randomized controlled trial in which participants randomly received 6 weeks of aquatic physical therapy or no aquatic physical therapy. The intervention resulted in less pain and joint stiffness and greater physical function, quality of life, and muscle strength¹⁰.

3.7 Studies on muscle strengthening exercises in osteoarthritis

A study was done to compare the efficacy of aerobic walking and home based quadriceps strengthening exercises in patients with knee osteoarthritis with a non-exercise control group which showed both aerobic walking and home based quadriceps strengthening exercise reduce pain and disability from knee osteoarthritis but no difference between them was found on indirect comparison.²¹

A randomized controlled trial of effects of lower-extremity strength training on incidence and progression of knee OA suggested the rate of loss is slower with strength training (ST) than with range-of-motion (ROM). Compared with ROM, ST decreased the mean rate of joint space narrowing (JSN) in osteoarthritic knees. The result showed, strength training (ST) group retained more strength and exhibited less frequent progressive JSN over 30 months than the range-of-motion (ROM) group²⁵.

CHAPTER 4

METHODS

4.1 SUBJECTS

4.1.1 Sample size

Out of forty-five subjects who were screened for this study, thirty-nine participants who satisfied for the selection criteria were recruited. They were within the age range of 45 to 81 years (group average age \pm S.D., 63.07 ± 9.14) from both the genders with 17 females and 22 males.

4.1.2 Inclusion criteria

- i. Both male and female.
- ii. Aged above forty-five years.
- iii. Who had moderate to severe pain in the knee at the time of recruitment.
- iv. Met the American College of Rheumatology (ACR) criteria for osteoarthritis of the knee.

(Details attached in the Appendix A, 1)

4.1.3 Exclusion criteria

- i. Those with knee pain but not due to OA.
- ii. Aged below forty-five years.
- iii. Had undergone recent knee surgery
- iv. Had major knee injury
- v. Patients who were on medication

4.1.4 A signed informed consent was obtained from all the subjects. This project has been approved by the Institutional Review Board (IRB) & International Ethical Committee (IEC). (A copy of Informed consent form is provided in Appendix A, 2)

4.1.5 Source of subjects

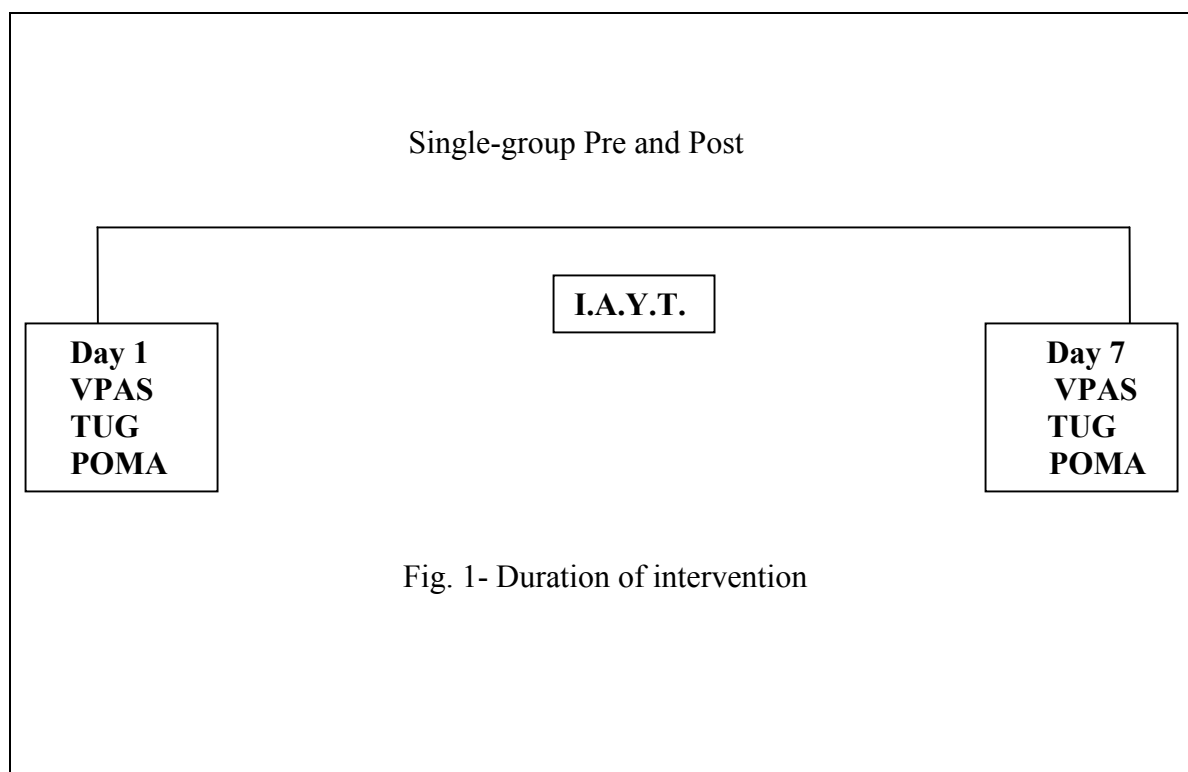
The participants who attended a week-long Yoga therapy treatment camp at Patna city, and were assigned to osteoarthritis section were selected for the study.

4.1.6 Masking

Since this was a single arm interventional study, blinding was not possible. It was ensured that the persons who did the assessments were not involved in administering the intervention. All sheets of VPAS used for pre and post assessment were coded and kept away. Assessment for data extraction were done after completion of the study by a third person and then decoded.

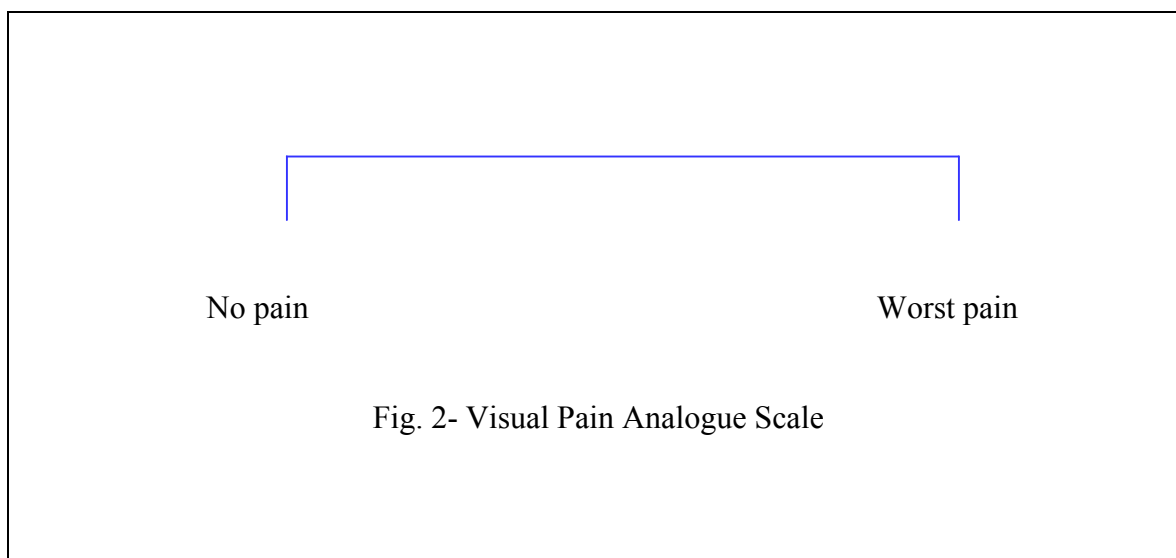
4.2 DESIGN

The design was a single group pre-post design. The assessments were done on day 1st and day 7th of a week long non-residential camp. Integrated Yoga module was administered to the participants 6 hours daily for 7 days.



4.3.1 Visual Pain Analog Scale (VPAS)

This is considered to be a simple & reliable measure of pain consisting of 10 cm horizontal line marked in the centre of a clean white sheet with 'Nil' pain and 'Worst possible' pain written in words at the two extremes and used to assess the severity of pain. The subjects indicate his degree of pain by marking a dot on this line. Different sheets were used before and after the program. The patient was briefed that keeping the maximum pain that they have ever experienced in their knees, they need to assess the present pain in terms of the length of the line on VPAS as measured from left to right and mark the point. This length was measured with a scale in centimeters to give the values for VPAS. This was obtained once on the first day and again on the 7th day and compared.



4.3.2 Timed Up and Go (TUG)

The timed get up and go test is a measurement of mobility. It includes a number of tasks such as standing from a sitting position, walking, turning, stopping and sitting down which are all important tasks needed for a person to be independently mobile. The patient is observed and timed while he rises from an arm chair, walks 3 meters, turns, walks back, and sits down again. The timed "Up & Go" test is a reliable and valid test for quantifying functional mobility that may also be useful in following clinical change over time. The test is quick, requires no special equipment or training, and is easily included as part of the routine medical examination.

4.3.3 Performance Oriented Mobility Assessment (POMA)

The Tinetti assessment tool is an easily administered task-oriented test that measures an older adult's gait and balance abilities. A hard armless chair, Stopwatch or wristwatch and a 15 ft walkway is

needed for the test. The patient is asked to get up from a chair and the balance in different tasks is tested, such as immediate standing balance, balance when eyes closed, balance while turning 360 degree and while sitting down. Like that the patient was given instructions to walk on a straight line and then gait is tested by observing initiation of gait, step length and height, step symmetry, step continuity, path deviation, trunk position, walking stance. The time taken for completion is 10- 15 minutes. Scoring is done by a three-point ordinal scale, on 9 items for balance and 7 items for gait test with scores ranging from 0-2. “0” indicates the highest level of impairment and “2” the individual’s independence. Total balance score 16 and total gait score is 12 which make the total test score to 28. If the score ranges between 25-28 it is interpreted as low fall risk, if 19-24 then medium fall risk and if the score is < 19 it indicates high fall risk.

4.4 INTERVENTION

The subjects received Integrated Approach of Yoga Therapy (IAYT) i.e. yoga based lifestyle change intervention for seven days. The specific set of physical practices of yoga for different medical disorder developed by SVYASA based on the concept described in the traditional yoga texts (*Pātanjali Yoga Sutra*, *Yoga Vasistha* and *Māndukya Kārikā*) were taught by trained therapists in small groups clustered according to their disease.

Daily schedule of practices

S. No.	Time	Name of the practice
1	05.00-05.30 am	<i>Pratasmaraṇ and OM</i> meditation
2	05.30-06.30 am	Breathing exercises and <i>prāṇāyāma</i>
4	09.00-10.00 am	Lectures
5	10.00-12.00 am	Knee pain special techniques
6	12.00-1 pm	Counseling with section doctor and DRT
7	05.30-6.30 pm	Devotional practice
8	6.30-7.30 pm	<i>Satsaṅg</i>

Sūkṣmavyāyāma

Kneepain special technique consisted of physical practices done with slow movements, repeated with rhythmic breathing and internal awareness to improve flexibility through non-weight bearing yogic loosening practices called *sūkṣmavyāyāmas*. These practices were designed

- a) to give deep rest to the soft tissues of the knee joint.
- b) to improve blood flow to the affected area through rest and relaxation.
- c) to strengthen the flexor and extensor muscles of the knee joint through repetitive yogic practices.

Yogāsana

Simple physical postures (in standing, sitting, prone and supine postures), performed with awareness, concentration, comfortably and with slow breathing procedures. The *āsana* practices end with the participant maintaining the final posture with the body relaxed. Specific *yogāsanas* for the therapeutic benefit of each and every joint of the body were given. All these physical practices were meant to reduce the pain, overcome the stiffness and increase the mobility of the joints. All the practices were safe. Maintenance of deep internal awareness was emphasized. (The list of special technique for knee pain are given the Appendix A, 3).

Prāṇāyāma

Sectional breathing was taught, which comprises of abdominal breathing (diaphragmatic breathing), thoracic breathing (intercostals breathing), and clavicular breathing. It is followed by full yogic breathing. For overweight patients who had no hypertension, *Surya anuloma viloma (SAV) prāṇāyāma* (Right nostril breathing) was given 27 rounds, 4 times a day as a specific breathing practice. It has been shown that SAV increases the metabolic rate and activates the sympathetic nervous system. So it is recommended for obese people with no associated hypertension. *Nāḍī śuddhi prāṇāyāma* (alternate nostril breathing) was given for 9 rounds. *Bhrāmarī prāṇāyāma* was also given for 9 rounds. The principles involved in these practices are to slow down the breathing rate and to calm down the mind.

Meditation

According to yoga, OA of knees, a manifestation of aging, is considered a lifestyle born disease called *ādhija vyādhi*. The root cause of all *ādhija vyādhi* is in *manomaya koṣa*. Hence the practices at the mental level are relevant to correct the problems in a holistic way. Meditation and devotional sessions are valuable tools to directly handle the emotional state of the mind. The art of emotional culture uses

the concept of devotion to replace the speeded up distressful emotions by softer emotions of pure love. Understanding the concept that the expression of the divine and pure love is to find joy in the joy of others and to find more joy in giving instead of expecting from others reduces the stress in oneself and relationship with others.

Lectures

Seven lecture sessions of 60mins each day (a) definitions of yoga (b) yogic concept of body, mind and disease (c) yogic concept of stress and desire (d) ole of healthy yogic diet (e) ole of asanas, *prānāyama*, meditation, happiness analysis, emotion cutler, secrete of action in blissful awareness (f) modern moderate understand of the role of life style in chronic non-cammunable desires and yogic approach to life style change.

Happiness Analysis and Devotional session

Lectures on notional correction or happiness analysis were given. It essentially dealt with the fact that we touch the bed of silence during all joyful moments. This is the principle behind the concept of happiness analysis found from an ancient Indian text *Taittirīya Upaniṣad*. The issues of life are resolved with notional correction, which could be the cause of stress. The science of *yoga* and *vedānta* says that the fundamental stuff of this universe is made of 'Bliss'. To realize and live in this blissful state under all circumstances is the goal of life.

Relaxation techniques

Different types of guided relaxation such as Instant Relaxation Technique (IRT), Quick Relaxation Technique (QRT), Deep Relaxation Technique (DRT) and *Savāsana*. The principle used was "deep conscious rest to the cells of sick organ to rejuvenate and restore their function". All practices included in this program were designed to bring about a yogic life style change through mastery over mind.

4.5 DATA EXTRACTION

Data were collected by

a) Pain Visual Analog Scale in centimeters for subjective pain assessment.

b) Using the electronic stopwatch to measure the time taken in Timed up and go test to assess the mobility.

c) POMA test to measure the balance and gait.

4.6 DATA ANALYSIS

Data were analyzed using Statistical package SPSS (Version 10.0) for windows. Data were tested for normality by Kolmogorov-Smirnov test. As the data was normally distributed, the pre-post comparisons were done by paired samples t – test (parametric).

CHAPTER 5 RESULTS

Out of forty five (45) participants enrolled, forty one (41) satisfied the inclusion criteria amongst which there were 22 males and 19 females. After a week-long intensive yoga program, the data of thirty-nine patients (17 female) was available for analysis. Two female participants could not come for follow-up because of busy work schedule. (The details of Trial profile is provided in Appendix B, 1)

Table-1 Demographic data

Sl. No.	Variables	Male	Female
1	Number	22	17
2	Age mean \pm SD	64.95 \pm 8.18	59.82 \pm 10.66
3	Age range - 45-50	1	5
4	56-65	9	7
5	66-75	10	3
6	76- 85	2	2
7	POMA - Low fall risk	14	11
8	Medium fall risk	8	6
9	High fall risk	0	0

a) Visual Pain Analog Scale (VPAS)

Participants reported high levels of pain at baseline (before yoga). There was a statistically significant decrease in the intensity of pain in the knee after undergoing 7 days of IAYT. A paired sample t-test

was done to assess the changes in pain following yoga within groups showed a significant decrease in pain following yoga in groups. [$P < 0.001$] The group mean values and standard deviations for both yoga and control groups are given in Table 2.

b) Timed up & go

Subject’s basic mobility skill was assessed by Timed up and go test at baseline, following IAYT. A paired samples t test showed a significant decrease in both the variables in the group, no. of steps taken and time taken following IAYT [$P < 0.001$]. The group mean values and standard deviations for both yoga and control groups are given in Table 2.

c) Performance oriented mobility assessment (POMA)

The balance and gait of the participants were assessed before and following one week of Integrated Approach of Yoga Therapy. A paired samples t test was done to assess the changes in balance and gait following IAYT within the group showed a significant decrease in risk of fall following IAYT in the group [$P < 0.001$]. The group mean values and standard deviations for both yoga and control groups are given in Table 2.

Table 2: Comparison of intensity of pain, functional mobility, balance and gait abilities of patients with osteoarthritis of knee following yoga intervention.

Variables	Pre Mean ± SD	Post Mean ± SD	p- value	Effect size	% change
Pain Visual Analogue Scale	6.59±2.24	3.97 ± 2.44	p<0.001***	1.15	39.85
TUG Steps taken	17.38±3.67	12.51 ± 2.51	p<0.001***	2.54	28.02
TUG Time taken	19.35±6.15	13.85 ± 4.19	p<0.001***	3.33	30.35
Performance Oriented Mobility Assessment	16.69±3.21	24.21 ± 2.86	p<0.001***	5.58	45.01

***P<.001 ‘after’ yoga compared to ‘before’ yoga. (Wilcoxon paired signed ranks test)

There was statistically significant decrease in the 'baseline' pain and risk of fall on day 7 compared to day 1. Also a significant improvement was noticed in their mobility following 7 days of IAYT.

CHAPTER 6

DISCUSSION

The results of the present study suggested a significant decrease in pain symptoms and improvement in mobility, gait and balance following 7 days of Integrated Approach of Yoga Therapy (IAYT).

An earlier study demonstrated statistically significant reductions in variables like Western Ontario and McMaster Osteoarthritis Index Universities (WOMAC) Pain, WOMAC Physical Function and Arthritis Impact Measurement Scale 2 (AIMS2) in patients with osteoarthritis of knee after a minimum period of 8-weeks long *yoga* in the tradition of B.K.S. Iyengar. Hence, the decrease in pain and stiffness due to IAYT practice in the present study is similar to the previous research of decrease in pain, restricted activity and functional disability due to Iyengar *yoga*¹⁷. A previous report on effect of *yoga* on the hands of patients with osteoarthritis (OA) also supports the result of this study, which showed significant reduction in pain and tenderness during activity, and improvement of range of motion of the joints affected by osteoarthritis¹⁹. The factors contributed to this could be attributed to the fact that, *yoga* uses stretching and improves strength so that it could be beneficial for musculoskeletal problems⁴.

Based on studies showing a relation between weaker quadriceps strength and increased risk of developing knee osteoarthritis²¹, it can also be argued that use of quadriceps strengthening exercises strengthened the muscle which ultimately improved the overall functioning of the knee joint and reduced the pain and stiffness. The evidence for mind-body therapies (eg, relaxation, meditation, imagery, cognitive-behavioral therapy) in the treatment of pain-related medical conditions have been

documented²³. These findings are similar to an earlier study which demonstrated Guided Imagery (GI) with Progressive Muscle Relaxation (PMR) reduces pain and mobility difficulties of women with OA¹³, and improves functional ability²². *Yogic* relaxation techniques also helped to reduce stress and improved awareness and concentration that could have facilitated the change in balance and gait. This was believed to be related to the fact that *yoga* practice helps to improve strength and flexibility, and may help to control physiological variables as blood pressure, respiration and heart rate, and metabolic rate to improve overall exercise capacity¹⁸ and it also helps in restoring balance and physiological homeostasis²⁵. Another study supports these changes where immediate reduction in pain (PAS) in patients with chronic pain of more than six months has been observed due to reduction in sympathetic activity (HR, RR, GSC amplitude of pulse wave on finger plethysmography and BP) after 30-minute session of *pranic* healing.

Though studies have shown various non-pharmacologic interventions to reduce pain in individuals^{3, 6, 7, 9, 12}, the fact that *yoga* helped in decreasing pain intensity could be confounded due to muscle relaxation¹³, muscle strengthening^{8, 21}, calming down the mind²³ and stress reduction²⁴.

This intervention was helpful in producing positive changes on a variety of outcomes like reducing pain and stiffness, decreasing disability as such also helped to improve in terms of changes in the basic mobility skills along with a patient's balance and gait improvements and it may be hypothesized that changes in these outcomes could be one of the mechanisms of action of our intervention. Benefits conferred by our findings could have implications for treating osteoarthritis of knee effectively with IAYT.

CHAPTER 7

SUMMARY AND CONCLUSION

1. The background

Osteoarthritis is a very broad term which affects the over all condition of a particular joint mainly because of wear and tear of the articulating cartilage. With the limitations of medical treatment and the ongoing problems with symptom management, it is not surprising that many individuals with knee pain turn to complementary and alternative medicine therapies.

2. The Aim

This study was an attempt to examine the efficacy of Integrated Approach of Yoga Therapy in patients with osteoarthritis of knee in a non-residential set-up.

3. The Methods

Variables viz. Pain Visual Analog Scale, Timed Up & Go and Performance Oriented Mobility Assessment were evaluated in 39 patients (M-22, F-17) aged between 45 to 81 years (mean age \pm SD, 63.07 ± 9.14) at the beginning and end of a non-residential *yoga* therapy camp. The patients were examined twice: at baseline before intervention and after seven days, as follow-up. During the intervening seven days, they received Integrated Approach of *Yoga* Therapy.

4. The Results

The results of the present study suggested a significant decrease in pain symptoms and improvement in mobility, gait and balance following 7 days of Integrated Approach of Yoga Therapy (IAYT).

5. The Conclusion

This study suggests that Integrated Approach of *Yoga* Therapy (IAYT) is effective in reducing pain and improving the mobility, gait and balance in patients with osteoarthritis of knee.

CHAPTER 8

LIMITATIONS OF THE STUDY AND SUGGETIONS FOR FUTURE WORK

Limitations of the Study

- i) There was no control group. Participants were participating in a short one week non-residential program.
- ii) Sample size was small.
- iii) The group did their practices in a yogic atmosphere and environment for few hours. They didn't spend the whole day in the camp site. Diet was not taken care of. This might have an influence in giving a lesser degree of improvement.

Implication of the findings

Integrated Approach of Yoga Therapy (IAYT) can be used effectively in treating osteoarthritis (OA) of the knee.

Direction for future research

- i) This research was conducted among participants in a non-residential set-up. It will be worthwhile to track the program achieved by participants periodically after they return back to their home environments.

- ii) If the radiological changes of the knee can be trapped by MRI scans before and after the program, there could be an additional concrete evidence of progress.
- iii) The group can be compared with conventional modern medicine and other complimentary alternative therapies.
- iv) The test can be applied to larger samples.

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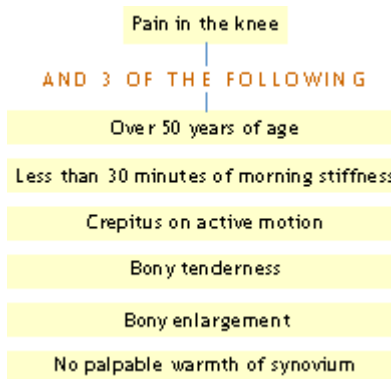
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APPENDIX A – 1

ACR Clinical Classification Criteria for Osteoarthritis of the knee:

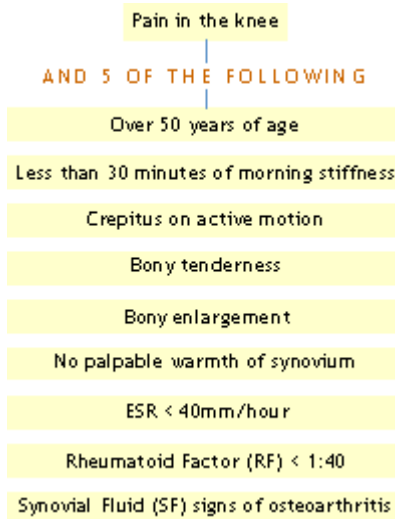
Using history and physical examination



Using history, physical examination and radiographic findings:



Using history, physical examination and laboratory findings:



Reference: Altman, R, et al.: Arthritis Rheum 29:1039, 1986.

APPENDIX A – 2

SIGNED INFORMED CONSENT FORMS

Title of the project - Effect of yoga on pain, mobility, gait and balance in patients with osteoarthritis of knee.

Investigator – Dr. Rajashree Ranjita

Name of the participant -

Age/Sex –

About the project -

In order to understand the effect of Integrated Approach of Yoga Therapy on pain, mobility, gait and balance in patients with osteoarthritis of knee, we'll be doing some tests, such as standing from a sitting position, walking, maintaining balance in various positions etc.

Please note:

1. All information obtained during the study will be kept confidential and individual test reports will be given.
2. You can withdraw from the study at any point of time unconditionally.
3. In case the study does cause any adverse effects, the institution is not liable.

I hereby have understood the above and consent voluntarily to participant in the study.

Date

Time

Signature of the participant

APPENDIX A - 3

TINETTI PERFORMANCE ORIENTED MOBILITY ASSESSMENT (POMA)*

Description:

The Tinetti assessment tool is an easily administered task-oriented test that measures an older adult’s gait and balance abilities.

Equipment needed: Hard armless chair
 Stopwatch or wristwatch
 15 ft walkway

Completion Time: 10-15 minutes

Scoring: A three-point ordinal scale, ranging from 0-2. “0” indicates the highest level of impairment and “2” the individuals independence.

Total Balance Score = 16

Total Gait Score = 12

Total Test Score = 28

Interpretation:

25-28 = low fall risk

19-24 = medium fall risk

< 19 = high fall risk

* Tinetti ME. Performance-oriented assessment of mobility problems in elderly patients. *JAGS* 1986; 34: 119-126. (Scoring description: PT Bulletin Feb. 10, 1993)

Tinetti Performance Oriented Mobility Assessment (POMA)

BALANCE TESTS

Initial instructions: Subject is seated in hard, armless chair. The following maneuvers are tested.

1. **Sitting Balance**

Leans or slides in chair	=0	
Steady, safe	=1	_____

2. **Arises**

Unable without help	=0	
Able, uses arms to help	=1	
Able without using arms	=2	_____

3. **Attempts to Arise**

Unable without help	=0	
Able, requires > 1 attempt	=1	
Able to rise, 1 attempt	=2	_____

4. **Immediate Standing Balance (first 5 seconds)**

Unsteady (swaggers, moves feet, trunk sway)	=0	
Steady but uses walker or other support	=1	
Steady without walker or other support	=2	_____

5. **Standing Balance**

Unsteady	=0	
Steady but wide stance(medial heels > 4 inches apart) and uses cane or other support	=1	
Narrow stance without support	=2	_____

6. **Nudged** (subject at maximum position with feet as close together as possible, examiner pushes lightly on subject's sternum with palm of hand 3 times)

Begins to fall	=0	
Staggers, grabs, catches self	=1	
Steady	=2	_____

7. **Eyes Closed** (at maximum position of item 6)

Unsteady	=0	
Steady	=1	_____

8. **Turing 360 Degrees**

Discontinuous steps	=0	
Continuous steps	=1	_____
Unsteady (grabs, staggers)	=0	
Steady	=1	_____

9. **Sitting Down**

Unsafe (misjudged distance, falls into chair)	=0	
Uses arms or not a smooth motion	=1	
Safe, smooth motion	=2	_____

BALANCE SCORE: _____/16

Tinetti Performance Oriented Mobility Assessment (POMA)

GAIT TESTS

Initial Instructions: Subject stands with examiner, walks down hallway or across room, first at “usual” pace, then back at “rapid, but safe” pace (using usual walking aids)

10. Initiation of Gait (immediately after told to “go”)

Any hesitancy or multiple attempts to start	=0	
No hesitancy	=1	_____

11. Step Length and Height

Right swing foot

Does not pass left stance foot with step	=0	
Passes left stance foot	=1	_____
Right foot does not clear floor completely		
With step	=0	
Right foot completely clears floor	=1	_____

Left swing foot

Does not pass right stance foot with step	=0	
Passes right stance foot	=1	_____
Left foot does not clear floor completely		
With step	=0	
Left foot completely clears floor	=1	_____

12. Step Symmetry

Right and left step length not equal (estimate)	=0	
Right and left step length appear equal	=1	_____

13. Step Continuity

Stopping or discontinuity between steps	=0	
Steps appear continuous	=1	_____

14. **Path** (estimated in relation to floor tiles, 12-inch diameter;
 observe excursion of 1 foot over about 10 ft. of the course)

Marked deviation	=0		
Mild/moderate deviation or uses walking aid	=1		
Straight without walking aid	=2		_____

15. **Trunk**

Marked sway or uses walking aid	=0		
No sway but flexion of knees or back or Spreads arms out while walking	=1		
No sway, no flexion, no use of arms, and no Use of walking aid	=2		_____

16. **Walking Stance**

Heels apart	=0		
Heels almost touching while walking	=1		_____

GAIT SCORE = _____/12
BALANCE SCORE = _____/16
TOTAL SCORE (Gait + Balance) = _____/28

{ < 19 high fall risk, 19-24 medium fall risk, 25-28 low fall risk }

APPENDIX A - 4

KNEE PAIN SPECIAL TECHNIQUES

Śithilīkarana Vyāyāma (loosening exercises)

Passive rotation of toes

Toe bending

Ankle bending

Ankle rotation

Knee bending

Knee rotation

Knee cap tightening

Half butterfly

Full butterfly

Waist rotation

Wrist rotation

Shoulder rotation

Neck bending

Neck rotation

Śakti Vikāsaka (Sūksma Vyāyāma)

Mani Bandha Śakti Vikāsaka

Kara tala Śakti Vikāsaka

Anguli Śakti Vikāsaka

Kaphoni Śakti Vikāsaka

Bhuja Bandha Śakti Vikāsaka

Kati Śakti Vikāsaka

Janghā Śakti Vikāsaka

Pindali Śakti Vikāsaka

Yogāsanas

Ardhakati Cakrāsana

Pāda Hastāsana

Ardha Cakrāsana

Bhujangāsana

Śalabhāsana

Dhanurāsana

Matsyāsana

Halāsana

Cakrāsana

Śasānkāsana

Vakrāsana/Ardha Matsyeñdrāsana

Ustrāsana

Relaxation techniques

IRT

QRT

DRT