ISSN: 0976-3031

International Journal of Recent Scientific Research

Impact factor: 5.114

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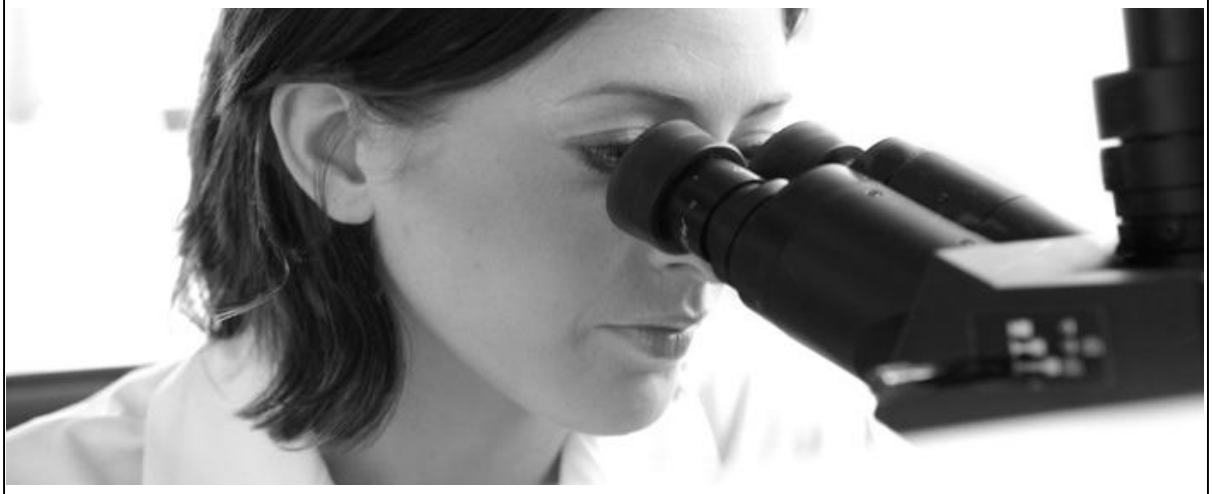

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Volume: 6 Issue: 9

THE PUBLICATION OF
INTERNATIONAL JOURNAL OF RECENT SCIENTIFIC RESEARCH
http://www.recentscientific.com
E-mail: recentscientific@gmail.com

ISSN: 0976-3031

Available Online at http://www.recentscientific.com

International Journal of Recent Scientific Research
Vol. 6, Issue, 9, pp.6331-6346, September, 2015

International Journal of Recent Scientific Research

RESEARCH ARTICLE

DEGENERATIVE CHANGES IN LUMBAR-REGION OCCUR SIMULTANEOUSLY WITH BILATERAL-OSTEOARTHRITIC CHANGES IN KNEE-JOINTS AND VICE-VERSA: NORMALISATION WITH TOPICAL APPLICATION OF PHYTOCONSTITUENTS BY SPECIALIZED TECHNIQUES INVOLVING POSSIBLE CARTILAGE-REGENERATION

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ARTICLE INFO

Article History:

Received 06th June, 2015
Received in revised form 14th July, 2015
Accepted 23rd August, 2015
Published online 28st September,2015

Key words:

Osteoarthritis, Degenerative changes, Phytoconstituents, Normalization, Topical application, Muscles and cartilage regeneration

ABSTRACT

Objective: The objective was to normalize the osteoarthritic changes of knee-joints and degenerative changes in lumbar spineby topical application of phytoconstituents with specialised techniques.
Materials and methods: 980 nos. of patients were selected, who generated to be part of the study. Finally after exclusion criteria, 198 patients (males: 66(33%) and females: 132 (67%)), of60.32 ± 9.84 years old, suffering more than four years with medial tibiofemoral osteoarthritic changes in both knee joints and degenerative changes in the lumbar spine were selected and therapeutic efficacy was evaluated by phytotherapeutic applicationtill 42 sittings.
Results: The present results indicated for the first time, by topical applications of phytoconstituents in six postural positions could fully normalize the degenerative changes in lumbar regions and osteoarthritic changes in both knee joints, possibly by the regeneration of muscles and cartilages.
Conclusion: Low back pain and knee pain can be removed by topical application of phytoconstituents by a specialised techniques in 42 sittings, possibly through regeneration of muscles and improving cartilage formation at the articular, hyaline and semilunar levels.

INTRODUCTION

The painful disease, knee osteoarthritis (OA) mainly causes by obesity and major bone and muscle injuries (Felson, 1988; Peat *et al.*, 2001). Low back pain affects approximately 60-85% of adults in different times (Frymoyer, 1988; Anderson, 1999; Green *et al.*, 2007). The terms lumbar osteoarthritis (OA), disc degeneration, degenerative disc disease and spondylosis are used in life to describe anatomical changes to the vertebral bodies and invertebral disc spaces that may be associated with clinical pain syndromes. Spinal osteoarthritis is known as degenerative process caused by narrowing of joints space, osteophytosis, subcholonal sclerosis and cyst formation (Kraan and Berg, 2007; Pye *et al.*, 2007).

Spondylosis deformans describe bony outgrowths arising primarily above the anterior and lateral perimeters of the vertebral end plate apophyses. These hypertrophic changes are believed to develop at sites of stress to the annular ligament and most commonly occur at thoracic T_9-T_{10} and lumbar L_3 levels (Rothschild, 2008). These osteophytes have minimal effect on intervertebral disc height (Fardon and Milette, 2001). By contrast, intervertebral osteochondrosis describes the formation of non-pathological end plate osteophytes, associated with narrowing of disc space (Fardon and Milette, 2001). If protruding within the spinal canal or intervertebral foramina, these bony growths may compress nerves with results of canal stenosis. Moreover, these bony projections may limit joints mobility and invade other organs and tissues (Kraan and Berg, 2007). When there is compression between the vertebrae L_4-L_5 or L_5-S_1 in the lumbar region it is known as slip dics (Burke, 2013). In lumbar spondylosis compression occur at L_3-L_4, L_4-L_5, L_5-S_1 regions of the vertebrae.

The knee is one of the largest and most complex joints in the body. The knee joins the thigh bone (femur) to the shin bone (tibia). The smaller ones that run alongside the tibia (fibula) and the kneecap (patella) are the other bones that make the knee joint. Ligaments of the knee joint are (a) the anterior cruciate ligament which prevents the femur from sliding backwards on the tibia, (b) the posterior cruciate ligament which prevents the femur from sliding forward on the tibia and (c) the medial and lateral collateral ligaments which prevents the femur from sliding side to side. The important muscles of

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the knee are vastus lateralis, semi-tendinosus, vastus medialis, semimembranosus and plantaris. In knee pain, especially in osteoarthritis the above are affected, degenerated and damaged. The treatment is long term with pain killer, hayaluronic acid injection and use of non-steroidal anti-inflammatory medications. If not cured, surgery is ultimate solution in general practice and this practice is followed worldwide.

The aim was to establish for the first time that certain phytoconstiuents whether can make complete reversal of these deformities of both knee joints and lumbar region to normal level within 42 sittings of osteoarthritic patients. These phytoconstiuents are applied in an oil base with specialized techniques in affected tissues. The present study is based on quantification of pain sensation (WOMAC Index), radiological images, anatomical measurements and biochemical parameters.

MATERIALS AND METHODS

Recruitment of patients

Ninehundredeightys even patients from OPTM Health care(P) Ltd, Kolkata, Delhi and Mumbai Centres, India from August; 2014 to March, 2015 were enrolled into this study. The study protocol was evaluated and approved by the OPTM Research Institution's Ethics Committee and the Institution is Government registered. The Flowchart of the patients who finally participated in this study is provided in Figure 1. Initially, 390 patients (male:174 and female:216) out of 987 were selected, based on the signs, symptoms and radiological changes consisted with OA changes in right knee joint, left knee joint and degenerative changes in lumbar spine in the first phase of the screening procedure. The total of 198 patients suffering for more than four years (when normally theyreport to the clinic) with medial tibiofemoral OA changes in the right and left joint and degenerative changes in the lumbar spine were selected using exclusion criteria summarized in Table 1. All patients signed the Institutional Review Board approved consent form for physical examinations, blood samples collection and X-ray reports required for this study. Patients were otherwise healthy, were aged 40 years or older, and had a diagnosis of OAchanges in knee joints and degenerative changes in the lumbar spine. After recruitment, the demographic data and baseline characteristics of the patients were noted and summarized in Table 2.

Study design

After the analysis of exclusion criteria including discontinued patients (dropped out) were over, the balance of 198 (66 males and 132 females) patients with symptoms of extremely painful(A), very painful(B), moderately painful(C), slightly painful(D) and no pain(E) simultaneously in the right knee joint, left knee joint and lumbar spine were finally involved in the study.

Each patient completed a questionnaire, providing details regarding demographics, medical history, nutritional status, ethnic barriers and work status at the baseline evaluation. Each patient was also physically examined and observations were noted in order to analyse and justify the anatomical and physiological conditions of knee joints, ankle joints, thighs, lumbar spine and calf muscles structure.

For the purpose of this study, all patients were examined and analysed for the followings at the baseline and during the follow-up evaluations on sittings 7, 14, 21, 28, 35 and 42 in the clinic:

- Measurement of the knee gaps between the short head of biceps femoris and surface of the bed (KGB) shown in Table 3A.
- Diameter of group of calf muscles (DCM) shown in Table 3B.
- Diameter of group of thigh muscles (DTM) shown in Table 3C.
- Diameter of group of muscles connected with knee joints, 4cm above the patella (DAP) shown in Table 3D.
- Diameter of group of muscles connected with knee joints, 4cm below the patella (DBP) shown in Table 3E.
- The bilateral angles of flexion in supine, prone and standing positions shown in Tables 4A – 4C.
- The bilateral angles of extension in supine, prone and standing positions shown in Tables 4D – 4F.

Pain, Stiffness and Functional disability score evaluation

The assessments of pain, stiffness and function at disability of each patient were noted for all males and females separately using The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC index) (Bellamy *et al*. 1988) at the baseline and at the end of 42 sittings evaluations as shown in Table 5A.

New sensation of pain reporting scale evaluation

This scale is introduced by the author in order to justify the pain sensation in three different places simultaneously such as right knee joint, left knee joint and lumbar spine region. For the purpose of quantifying the sensation of pain reporting in the above mentioned three places, the author had established a simple sensation of pain reporting scale as 'A' which implies extremely painful, 'B' which implies very painful, 'C' which implies moderately painful, 'D' which implies slightly painful and 'E' which implies no pain. Normally patients suffering extremely painful (A) or very painful (B) condition reported to the clinic for check-ups and treatment thereon. For the purpose of the study, the above mentioned parameters for intensity of pain in the right knee joint, left knee joint and lumbar region at the baseline and at the end of 42 sittings evaluations were noted in Table 5B.

Biochemical parameters evaluation

Biochemical parameters such as C-reactive protein (CRP), muscle creatine phosphokinase(CPK) and aldolase were

measured by the methods of Spector *et al*., 1997; Tietz, 2012; Kim *et al*., 2007 from collected blood/serum for all males and females at the baseline and at the end of 42 sittings evaluations as shown in Table 5C.

Body weight evaluation

The body weights of each patients were noted for all males and females separately at the baseline and at the end of 42 sittings evaluations and shown in Table 5D.

Radiological images evaluation

Radiological images of both knee joints and lumbo sacral spine were collected at baseline and at the end of 42 sittings evaluations. The radiological pictures of both knee joints and lumbo sacral spine of such six patients at baseline and at the end of 42 sittings are shown in Figure 3A, 3B, 3C, 3D, 3E and 3F and 4A, 4B, 4C, 4D, 4E and 4F respectively (Ganguly, 2015c).

Table 1 Exclusion criteria during selection of human subjects

Out of 390 patients, 192 patients (90 males and 102 females) were excluded.

After check-ups

105 patients (50 males and 55 females) were excluded for the following reasons:

1. patients with cuts, wounds or any type of chronic skin disease (eczema, psoriasis etc) on the back, in legs, pelvic region, inguinal (groin area) and other regions (8 males and 6 females).
2. with parallel multiple drug dependence (9 males and 12 females).
3. with surgical implants (11 males and 14 females).
4. with pacemaker (9 males and 4 females).
5. with history of cancer (3 males and 9 females).
6. with history of severe neurological diseases (8 males and 7 females)
7. With allergic to *Ricinuscommunis*, *Calotropis gigantean*, *Poederiafoetida* and *Matricariachamomilla* (2 males and 3 females).

Discontinued (dropped out) during treatment

87 patients (58 males and 29 females) were discontinued their treatments in the clinic because of : 1) problems for transportation, 2) shortage of helping hands at old age
3) unable to apply medicines at home, twice/thrice a day and 4) transferring the jobs in other city as under:

1. 18 patients after four sittings (16 males and 2 females)
2. 36 patients after seven sittings (20 males and 16 females)
3. 21 patients after fifteen sittings (14 males and 7 females)
4. 12 patients after twenty sittings (8 males and 4 females)

Water extractions from the following Indian medical plants were used in the therapy

From *Ricinuscommunis*: root bark, leaves and beans, *Calotropis gigantean*: root bark and leaves, *Poederiafoetida*: leaves and flowers, *Matricariachamomilla*: flowers.

The parts of the plants were dried under shady pulverised and macerated for 48 hours at 25ºC ± 2º C with double distilled water with occasional stirring. The mixture was boiled and filtered to remove particulate matters and lyophilised. For topical application, the phytowater extracts of above plants were taken in virgin sesame oil (extracted at 40ºC from seeds) and virgin wheat germ oil (extracted at 40ºC from seeds) in order to restore the phytochemicals intact and wax was used to make paste.

Aims, Principles and Theories

The author had already elaborated in details the aim, principles and theories of the treatment protocol (Ganguly, 2015a).

The development of medicated fomentation device (MFD) and wooden roller device (WRD)

The author had already discussed the mechanism and silent features of the devices namely MFD and WRD developed by him for the purpose of mechanical stimulation absolutely required in connection with 'connective tissue massage theory' and 'spine and joint stimulation theory' for the development of transverse wave (Ganguly, 2015a).

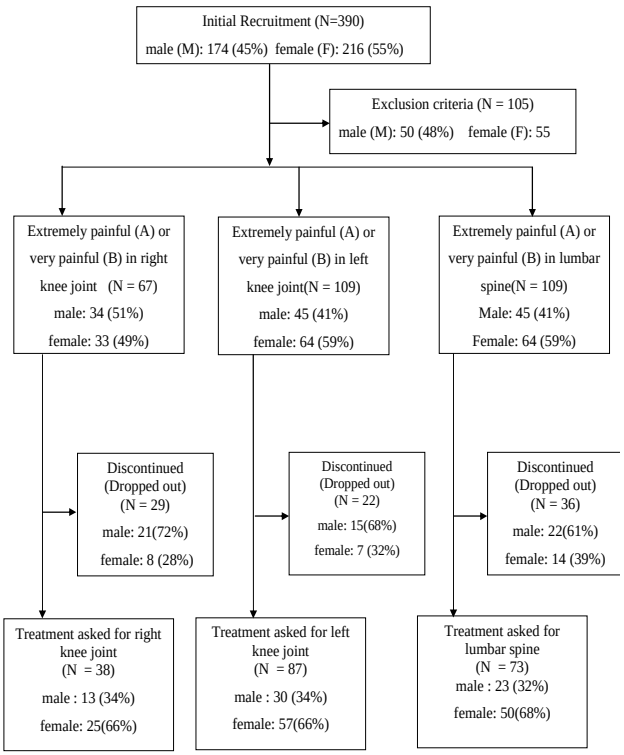

Figure 1 Flow chart of the patients who finally participated in this study

Treatment protocol

All types of muscles posse the fundamental properties of excitability, conductivity, contractibility, elasticity and viscosity. With the help of theories of chemical, mechanical, thermal and electrical stimuli – the muscles strength and blood circulation of different organs are enhanced, stiffness of muscles, muscular wasting, inflammation/blood clotting or effusion in the affected areas are removed. Here, the phytoconstituent paste acts as chemical stimulus, the transverse wave developed with the tips of three fingers manipulation along with the wooden device with 'connective tissue massage theory' and 'spine and joints manipulative theory' act as mechanical stimulus, the medicated fomentation device (MFD)

Table2 Demographic data and baseline characteristics of patient

Sl. No.		Total	Male	Female
1	No. Of patients	198	66 (33%)	132 (67%)
2	Age (years), mean (SD)	60.32 (9.84)	61.85 (11.35)	59.56 (8.94)
3	Weight (Kg), mean (SD)	70.74 (12.82)	74.45 (13.69)	68.88 (11.99)
4	Ethnic group: (Indian verities):			
	Bengali	42 (21%)	13 (31%)	29 (69%)
	Gujrati	16 (8%)	7 (44%)	9 (56%)
	Marwaree	25 (13%)	8 (32%)	17 (68%)
	Marathi	31 (16%)	10 (32%)	21 (68%)
	Tamil	9 (5%)	7 (78%)	2 (22%)
	Punjabi	34 (17%)	9 (26%)	25 (74%)
	Shindhi	33 (16%)	8 (24%)	25 (76%)
	North-east Indian	8 (4%)	4 (50%)	4 (50%)
5	Food habit:			
	Vegetarian	106 (54%)	31 (29%)	75 (71%)
	Non-vegetarian	92 (46%)	35 (38%)	57 (62%)
6	Multiple complains			
	Constipation	186 (94%)	58 (31%)	128 (69%)
	Over weight (Obesity)	148 (75%)	35 (24%)	113 (76%)
	Skin disorder	97 (49%)	41 (42%)	56 (58%)
	Acidity & Reflux	184 (95%)	51 (28%)	133 (72%)
	Insomnia	83 (42%)	28 (34%)	55 (66%)
	Varicose vein	89 (45%)	12 (13%)	77 (87%)
	Urinary incontinence	97 (49%)	15 (15%)	82 (85%)
7	Period of suffering (years), mean SD):	6.23 (1.65)	6.98 (9.8)	5.85 (1.31)
8	Main pain area: (Sensation of pain reporting scale)			
	a)Extremely painful (A):			
	Lower back / Spine :	51 (26%)	16 (31%)	35 (69%)
	Rt. Knee joints:	28 (14%)	8 (29%)	20 (71%)
	Lt. Knee joints:	58 (29%)	18 (31%)	40 (69%)
	b) Very painful (B):			
	Lower back / Spine :	22 (11%)	7 (32%)	15 (68%)
	Rt. Knee joints:	10 (5%)	5 (50%)	5 (50%)
	Lt. Knee joints:	29 (15%)	12 (41%)	17 (59%)
	c) Moderately painful (C):			
	Lower back / Spine :	29 (15%)	10 (34%)	19 (66%)
	Rt. Knee joints:	33 (17%)	14 (42%)	19 (58%)
	Lt. Knee joints:	24 (12%)	12 (50%)	12 (50%)
	d) Slightly painful (D):			
	Lower back / Spine :	26 (13%)	9 (35%)	17 (65%)
	Rt. Knee joints:	22 (11%)	7 (32%)	15 (68%)
	Lt. Knee joints:	13 (7%)	5 (71%)	8 (29%)
	e) No pain (E):			
	Lower back / Spine :	70 (35%)	24 (34%)	46 (66%)
	Rt. Knee joints:	105 (53%)	32 (30%)	73 (70%)
	Lt. Knee joints:	74 (37%)	19 (26%)	55 (74%)
9	WOMAC Index (%)			
	Pain Subscale	78.85 (7.13)	82.25 (7.62)	78.20 (6.80)
	Stiffness Subscale	76.75 (12.06)	75.25 (8.63)	77.50 (13.42)
	Physical function Subscale	89.03 (3.21)	89.96 (3.50)	88.56 (2.97)
10	Measures taken for diminishing pain and inflammation:			
	Using knee caps:	123 (62%)	41 (33%)	82 (67%)
	Using lumber belt	72 (36%)	23 (32%)	49 (68%)
	Paracetamol	193 (97%)	64 (33%)	129 (67%)
	Hyaluronic acid injection:			
	Rt. Knee joints	75 (38%)	28 (14%)	47 (86%)
	Lt. Knee joints:	118 (60%)	31 (26%)	87 (74%)
	Corticosleroidal injection:	182 (92%)	61(34%)	131 (66%)
	Arthrocentesis			
	Rt. Knee joints	48 (24%)	19 (40%)	29 (60%)
	Lt. Knee joints:	56 (28%)	23 (41%)	33 (59%)
	Physiotherapy:			
	Back pain:	63 (32%)	22 (35%)	41 (65%)
	Knee pain:	121 (61%)	40 (33%)	81 (67%)
	Massage with various ayurvedic/herbal/oil, gel, cream over pain areas only	195 (98%)	65 (33%)	130 (67%)
	Using stick/ Walker	47 (24%)	12 (26%)	35 (74%)
11	Work status			
	Employed fulltime	64 (32%)	27 (42%)	37 (58%)
	Employed part-time due to pain	21 (11%)	9 (43%)	12 (57%)
	Housewife/Homemaker:	43 (22%)	-	43 (100%)
	Unemployed because of pain	9 (4%)	3 (33%)	6 (67%)
	Retired	29 (15%)	10 (34%)	19 (66%)
	Self employed	32 (16%)	17 (53%)	15 (47%)

for the uniform, slow, steady and progressively increase of heat upto a particular degree of temperature over the affected areas acts as thermal stimulus and the microcomputerized muscle stimulator operated by a small battery cell of DC 9 volts having frequency of 1.5 – 75hz acts as electrical stimulus. The author had already elaborated in details of the protocol along with mechanism of the various stimuli including their effects over the human body (Ganguly, 2015a).

The mechanism of chemical, mechanical, thermal and electrical stimuli

The author had already explained the various mechanisms as well as 'pros and corns' of the above mentioned stimuli including their 'joint effects' over the human body (Ganguly, 2015a).

Postural positions during treatment

In the degenerative changes in knee joints and lumbar region, the muscles with associated nerves of the anterior, posterior, lateral and medial part of the thighs, back and lower legs were badly damaged. Hence, the simply topical application of phytopaste, medicated fomentation device, wooden roller and micro muscle stimulator on haphazard manner on the pain areas could not produce any effective result. So, the muscles as well as nerves responsible for various restricted movements had to be strictly identified and accordingly various programme for nourishment of the said muscles and associated nerves with different postures had to be fixed. For this purpose, the author researched and six postural positions had been identified such as supine position (Fig 2A), prone position (Fig 2B), right and left contralateral positions (Figs 2C-D) and right and left cross contralateral positions (Figs 2E-F). In order to nourish the group of muscles along with their respective nerves of thighs, back and legs, the paste form of phytonutrients was applied from the point of origin to the point of insertions of the muscles connected with back, thighs and legs, with the help of tip of three fingers and wooden roller manipulationsin particular techniques(Ganguly, 2015). There after medicated fomentation devices (Ganguly, 2015) were wrapped over the back muscles, thigh muscles, and leg muscles lying in six postural positions (Fig 2 A-F) in specific intervals.

After the chemical stimulation (produced with phytopaste), mechanical stimulation (produced with hand and wooden roller manipulations) and thermal stimulation (produced with medicated fomentation devices) were over, then the pulse therapeutic techniquewithmicrocomputerized muscles stimulator were applied over the group of muscles.These muscles were ractusfemoris, vastus lateralis, vastus medialis, sartorius, gracilis, semimembranosus, semitendinosus, biceps femoris, gluteus maximus and medius, internal and external obiques, gastrocenemius and popliteus including respective nerves from the point of origin to the point of insertions line on the above mentioned six postural positions in specific intervals to stimulate muscles, blood flow etc.The tissue cells were nourished. These also helped to disperse coagulated blood or effusion which might be present in the affected areas of the patients.

Images of six postural positions during the study onosteoarthritic patients (Source: Ganguly, 2015c)

Figure 2A Lying in supine position

Figure 2B Lying in prone position

Figure-2C Lying on right contralateral

Figure 2D Lying on left contralateral

Figure 2E Lying on rightcrossLying on left cross contralateral

Figure 2F contralateral

Treatment program

The treatment was programmed for forty two sittings in the clinic, once in six times a week and in the house, twice a day with the interval of two hours between the two applications. But the application of the phytopaste should be strictly followed thrice a day in prescribed quantity. In case of one sitting in the clinic and the next two times were mandatory at home or otherwise thrice a day was compulsory at home with a minimum interval of two hours. In the clinic, the treatments were given in two postural positions consecutively in order to nourish the muscles and the associated nerves of the thighs, back and lower leg regions with the help of phytopaste, medicated fomentation device and micro computerized muscles stimulator once a day. At home, only thephytopastewas to be applied with the help of tips of three fingers and wooden roller manipulations twice a day as per programmed sequences for forty-two sittings.

Reasons for selecting different postural positions were summarised below (source: Ganguly, 2015c):

Supine position: To nourish the muscles along with associated nerves of the anterior part of the thigh such as rectus femoris, vastus lateralis, vastus medialis, vastus intermedius, sartorius (part of originated area) and the muscles of the anterior part of the lower legs such as tibialis anterior, extensor hallucis longus and extensor digitorum longus and also to nourish the decending aorta and the inferior vena cava, phytonutrients were to be applied with specific techniques. (Fig 2A).

Prone position: To nourish the muscles along with associated nerves of the posterior part of the thigh such as semitendinosus, long head of biceps femoris, vastus lateralis, semimembranosus, adductor magnus, gluteus maximusand mediusand the muscles of the posterior part of the lower leg such as gastrocnemius and achilles tendon (triceps surae, part), flexor digitorium, flexor hallucis and also to nourish the inferior vena cava, phytonutrients were to be applied with specific techniques. (Fig 2B).

Right and Left contralateral positions: To nourish the muscles along with associated nerves of the lateral part of thigh and hip such as vastus lateralis, long head of biceps femoris, rectus femoris, iliotibial tract, tensor fasciaelatae,gluteus maximus, gluteus medius and the muscles of the lateral part of the lower leg such as fibularis (peroneus) longus and brevis, soleus (triceps surae, part) and gastrocnemius (triceps surae, part), extensor digitorium longus, and the patients were advised to lie down in right contralateral position (Fig 2C) and to nourish the right side of the body, the patients were asked to lie down in left contralateral position. (Fig 2D).

Right and Left cross contralateral positions: To nourish the muscles along with the associated nerves of the medial part of the thigh such as vastus medialis, sartorius, gracilis, semimembranosus, semitendinosus, adductor magnus and the muscles of the medial part of the lower leg such as gastrocnemius (triceps surae, part), flexor digitorium longus, soleus (triceps surae, part) and also to supply the phytonutrients to the inferior vena cava and at the same time the nourishment of the lateral part of opposite leg were jointly treated when the patientswere asked to lie down in right cross contralateral position (Fig 2E). To nourish the muscles of the opposite side of the body in the same manner, the patients were advised to lie down in left cross contralateral position (Fig 2F).

Treatment sequences in different postural positions in the clinic and at home for 42 sittings of treatment

Postural Positions			
WEEK	**IN THE CLINIC**	**AT HOME**	
		Morning	**Night**
1st Week (7 Sittings)	Prone and Supine positions	Prone and Supine positions	Prone and Supine positions
2nd Week (14 Sittings)	Left cross contralateral and Supine positions	Left cross contralateral and Right cross contralateral positions	Prone and Supine positions
3rd Week (21 Sittings)	Left contralateral and Prone positions	Left contralateral and Prone positions	Right contralateral and Supine positions
4th Week (28 Sittings)	Right cross contralateral and Supine positions	Right cross contralateral and Supine positions	Left cross contralateral and Prone positions
5th Week (35 Sittings)	Left cross contralateral and Prone positions	Left cross contralateral and Prone positions	Prone and Supine positions
6th Week (42 Sittings)	Prone and Supine positions	Left contralateral and Supine positions	Left cross contralateral and Right cross contralateral positions

- The postural positions and timings of phyomedicine applications were based on observations for optimum effects, tried on hundreds of patients before.
- Sometimes according to the severity of the pain as well as conditions of the deformity the above postural positions were modified.

Highlights of the treatment

The basic reason of pain in the various joint areas of the body occurs when there is an insufficient blood flow to an effected area due to tissue damage. The nature of pain can be either acute or chronic. Acute pain is a result of injury, surgery or illness while the later is an on-going systemic disorder. The common after effects are muscles stiffness, inflammation, loss of muscle tonacity, compression between vertebrae or joints, lymphoedema, fibrosis/ cysts and deposition of pain producing metabolites.

The author had already elaborated more in details the main features of 'Highlights of the treatment' (Ganguly, 2015).

Statistical Analysis

Statistical analysis was done by using software (Graph Pad Prism, Version, 5.0) for student-t test to determine significant values at $P<0.05$ level along with r (Pearson correlation coefficient) values to determine strong and weak correlation among two variables for measuring different improvements parameters of osteoarthritic patients for combined subjects of 198 (66 males and 132 females) for right and left legs

separately. All the data were considered and expressed at statistically significant (P<0.05) level.

Table 3 The anatomical improvements of muscles of right and left legs of 198 patients from baseline to 42 sittings in the intervals of 7th sittings and their statistical analysis having degenerative changes in both knee joints and lumbar region

		Baseline		7th Sitting		14th Sitting		21st Sitting		28th Sitting		35th Sitting		42nd Sitting	
		Rt Leg	Lt Leg	Rt Leg	Lt Leg	Rt Leg	Lt Leg	Rt Leg	Lt Leg	Rt Leg	Lt Leg	Rt Leg	Lt Leg	Rt Leg	Lt Leg
3A (KGB)	Combined Mean (SD);	6.25	6.34	5.34	5.33	4.72	5.00	4.18	4.19	3.72	3.71	3.26	3.26	2.85	2.85
	n = 198	(1.09)	(1.40)	(1.03)	(1.17)	(1.01)	(3.42)	(0.98)	(1.06)	(0.85)	(0.92)	(0.71)	(0.76)	(0.52)	(0.52)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.40	0.36	0.59	0.25	0.71	0.65	0.79	0.74	0.85	0.81	0.89	0.85
	Male Mean	6.18	6.03	5.18	5.10	4.56	4.44	4.07	3.99	3.54	3.49	3.14	3.11	2.83	2.83
	(SD); n = 66	(0.85)	(0.70)	(0.78)	(0.81)	(0.82)	(0.86)	(0.81)	(0.82)	(0.71)	(0.69)	(0.58)	(0.58)	(0.47)	(0.47)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.52	0.53	0.70	0.71	0.79	0.80	0.86	0.88	0.90	0.92	0.92	0.94
	Female Mean	6.29	6.31	5.41	5.44	4.80	5.28	4.24	4.29	3.81	3.81	3.32	3.33	2.86	2.86
	(SD) n = 132	(1.18)	(1.46)	(1.13)	(1.30)	(1.08)	(4.13)	(1.06)	(1.15)	(0.90)	(1.01)	(0.76)	(0.83)	(0.53)	(0.53)
	p-value	--	--	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.35	0.34	0.55	0.19	0.67	0.62	0.76	0.70	0.83	0.77	0.88	0.83
3B (DCM)	Combined Mean (SD);	35.70	35.40	34.80	35.00	34.40	34.40	34.20	34.20	34.50	34.50	34.80	34.90	35.30	35.30
	n = 198	(3.59)	(4.13)	(3.42)	(3.79)	(3.45)	(3.50)	(3.47)	(3.43)	(3.39)	(3.27)	(3.34)	(3.34)	(3.36)	(3.36)
	p-value	--	--	<0.01	=0.15	<0.01	<0.01	<0.001	<0.01	<0.01	<0.01	<0.01	=0.07	=0.13	=0.31
	r- value	--	--	0.11	0.05	0.18	0.13	0.21	0.16	0.17	0.12	0.12	0.07	0.05	0.02
	Male Mean	35.67	35.42	34.95	34.98	34.47	34.62	34.36	34.32	34.72	34.79	35.05	35.12	35.47	35.47
	(SD); n = 66	(3.93)	(3.45)	(3.49)	(3.58)	(3.54)	(3.66)	(3.57)	(3.69)	(3.53)	(3.51)	(3.42)	(3.59)	(3.37)	(3.37)
	p-value	--	--	=0.14	=0.24	<0.05	=0.10	<0.05	<0.05	=0.07	=0.15	=0.17	=0.30	=0.38	=0.47
	r- value	--	--	0.10	0.06	0.16	0.11	0.17	0.15	0.13	0.09	0.08	0.04	0.03	0.01
	Female Mean	35.65	35.45	34.79	35.05	34.36	34.34	34.06	34.20	34.32	34.43	34.69	34.77	35.17	35.17
	(SD) n = 132	(3.41)	(4.44)	(3.40)	(3.91)	(3.41)	(3.42)	(3.42)	(3.31)	(3.21)	(3.15)	(3.30)	(3.32)	(3.70)	(3.70)
	p-value	--	--	<0.05	=0.21	<0.01	<0.01	<0.001	<0.01	<0.01	<0.05	<0.01	=0.08	=0.13	=0.28
	r- value	--	--	0.12	0.05	0.18	0.14	0.23	0.16	0.19	0.13	0.14	0.09	0.07	0.04
3C (DTM)	Combined Mean (SD);	49.69	49.40	48.70	48.90	48.60	48.50	48.60	48.60	49.00	49.00	49.30	49.30	49.70	49.70
	n = 198	(5.65)	(6.77)	(5.82)	(5.64)	(5.63)	(5.69)	(5.66)	(5.64)	(5.62)	(5.63)	(5.63)	(5.63)	(5.70)	(5.70)
	p-value	--	--	=0.05	=0.25	<0.05	=0.07	<0.05	=0.12	=0.10	=0.26	=0.23	=0.43	=0.47	=0.33
	r- value	--	--	0.08	0.03	0.10	0.07	0.09	0.06	0.06	0.03	0.04	0.02	0.001	0.02
	Male Mean	47.73	47.86	46.55	46.88	46.51	46.59	46.55	46.67	47.00	47.09	47.36	47.41	47.79	47.79
	(SD); n = 66	(5.10)	(5.24)	(5.43)	(4.70)	(4.82)	(4.50)	(4.85)	(4.54)	(4.66)	(4.47)	(4.70)	(4.52)	(4.69)	(4.69)
	p-value	--	--	=0.10	=0.13	0.08	=0.07	=0.09	=0.08	=0.20	=0.19	=0.33	=0.30	=0.47	0.46
	r- value	--	--	0.11	0.10	0.12	0.13	0.12	0.12	0.07	0.08	0.04	0.05	0.01	0.02
	Female Mean	50.67	50.13	49.84	49.98	49.63	49.39	49.66	49.63	49.97	49.91	50.22	50.19	50.58	50.58
	(SD) n = 132	(5.68)	(7.31)	(5.72)	(5.80)	(5.74)	(6.00)	(5.76)	(5.88)	(5.81)	(5.91)	(5.83)	(5.90)	(5.95)	(5.95)
	p-value	--	--	=0.13	=0.43	=0.07	=0.18	=0.08	=0.27	=0.16	=0.39	=0.26	=0.47	=0.45	=0.29
	r- value	--	--	0.10	0.01	0.09	0.05	0.09	0.04	0.06	0.02	0.04	0.01	0.01	0.03
3D (DAP)	Combined Mean (SD);	43.50	43.11	42.70	42.70	42.00	42.20	41.70	41.80	41.90	41.90	42.20	41.90	42.50	42.50
	n = 198	(5.17)	(6.02)	(4.98)	(5.29)	(4.96)	(5.20)	(4.86)	(5.07)	(4.62)	(4.87)	(4.65)	(5.97)	(4.75)	(4.75)
	p-value	--	--	=0.06	=0.24	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	= 0.12
	r- value	--	--	0.08	0.03	0.14	0.08	0.17	0.11	0.15	0.11	0.13	0.10	0.10	0.06
	Male Mean	41.12	41.36	40.56	40.82	40.02	40.32	39.88	40.00	40.23	40.24	40.53	40.55	40.83	40.83
	(SD); n = 66	(4.10)	(4.13)	(4.09)	(4.13)	(4.20)	(4.04)	(4.18)	(4.00)	(3.86)	(3.93)	(3.89)	(3.87)	(3.92)	(3.92)
	p-value	--	--	=0.22	=0.22	=0.06	=0.07	<0.05	<0.05	=0.10	=0.06	=0.20	=0.12	=0.34	=0.22
	r- value	--	--	0.07	0.07	0.13	0.13	0.15	0.17	0.11	0.14	0.07	0.10	0.04	0.07
	Female Mean	44.63	43.98	43.73	43.67	43.04	43.07	42.66	42.73	42.81	42.77	42.97	42.54	43.27	43.27
	(SD) n = 132	(5.26)	(6.60)	(5.06)	(5.56)	(5.02)	(5.48)	(4.93)	(5.30)	(4.74)	(5.08)	(4.80)	(6.69)	(4.93)	(4.93)
	p-value	--	--	=0.08	=0.34	<0.05	=0.11	<0.01	<0.05	<0.01	<0.05	<0.01	<0.05	<0.05	=0.16
	r- value	--	--	0.09	0.03	0.15	0.07	0.19	0.10	0.18	0.10	0.16	0.11	0.13	0.06
3E (DBP)	Combined Mean (SD);	35.60	35.40	35.00	35.00	34.50	34.40	34.20	34.20	34.40	34.40	34.70	34.80	35.00	35.00
	n = 198	(3.73)	(4.47)	(3.64)	(3.80)	(3.65)	(3.78)	(3.48)	(3.48)	(3.33)	(3.38)	(3.26)	(3.33)	(3.29)	(3.29)
	p-value	--	--	<0.05	=0.16	<0.01	<0.01	<0.001	<0.01	<0.001	<0.01	<0.01	<0.05	<0.05	=0.12
	r- value	--	--	0.09	0.05	0.16	0.12	0.19	0.15	0.17	0.12	0.13	0.08	0.09	0.06
	Male Mean	34.61	34.17	34.11	33.79	33.61	33.36	33.53	33.33	33.85	33.73	34.08	34.07	34.36	34.36
	(SD); n = 66	(2.87)	(2.91)	(2.75)	(2.97)	(2.86)	(2.94)	(2.92)	(2.93)	(2.76)	(2.86)	(2.72)	(2.77)	(2.73)	(2.73)
	p-value	--	--	=0.15	=0.23	<0.05	=0.06	<0.05	=0.05	=0.06	=0.19	=0.14	=0.42	=0.31	=0.34
	r- value	--	--	0.10	0.06	0.17	0.14	0.18	0.14	0.13	0.08	0.09	0.00003	0.04	0.03
	Female Mean	36.15	36.06	35.43	35.63	34.89	34.97	34.61	34.62	34.70	34.79	35.05	35.11	35.28	35.28
	(SD) n = 132	(4.00)	(4.96)	(3.95)	(4.03)	(3.92)	(4.04)	(3.69)	(3.66)	(3.55)	(3.57)	(3.46)	(3.53)	(3.51)	(3.51)
	p-value	--	--	=0.07	=0.22	<0.05	<0.05	<0.001	<0.01	<0.001	<0.01	<0.01	<0.05	<0.05	=0.07
	r- value	--	--	0.09	0.05	0.12	0.12	0.20	0.16	0.19	0.15	0.14	0.11	0.11	0.09

RESULTS

The present results represent the anatomical improvements of muscles of right and left legs having degenerative changes/ reduction of joint space between the bones / vertebrae as shown in the x-ray plates on both knee joints and lumbar region before and after 42 sittings of treatment, knee gaps between the short head of biceps femoris and the surface of the bed (KGB) [3A], diameter of group of calf muscles (DCM) [3B], diameter of thigh muscles (DTM) [3C], diameter of group of muscles connected with knee joint, 4cm above the patella (DAP) [3D]

Table 3 The anatomical improvements of muscles of right and left legs of 198 patients from baseline to 42 sittings in the intervals of 7th sittings and their statistical analysis having degenerative changes in both knee joints and lumbar region

		Baseline		**7th Sitting**		**14th Sitting**		**21st Sitting**		**28th Sitting**		**35th Sitting**		**42nd Sitting**	
		Rt. Leg	**Lt. Leg**	**Rt. Leg**	**Lt. Leg**	**Rt. Leg**	**Lt. Leg**	**Rt. Leg**	**Lt. Leg**	**Rt. Leg**	**Lt. Leg**	**Rt. Leg**	**Lt. Leg**	**Rt. Leg**	**Lt. Leg**
4A Flexion in Supine	Combined Mean (SD); n = 198	117.00 (10.30)	114.00 (17.80)	122.00 (9.46)	121.00 (11.00)	126.00 (8.28)	124.00 (11.80)	129.00 (7.14)	129.00 (6.38)	133.00 (5.84)	133.00 (5.78)	136.00 (5.16)	136.00 (5.06)	140.00 (3.79)	140.00 (3.79)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.26	0.23	0.43	0.32	0.56	0.48	0.69	0.57	0.77	0.65	0.83	0.71
	Male Mean (SD); n = 66	119.97 (8.05)	119.91 (9.43)	125.03 (7.58)	124.97 (7.58)	128.21 (5.90)	128.36 (6.12)	130.88 (5.78)	131.27 (5.51)	134.27 (5.51)	134.64 (5.11)	137.48 (4.24)	137.79 (4.39)	140.82 (2.89)	140.82 (2.89)
	p-value	--	--	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.31	0.28	0.51	0.47	0.62	0.59	0.72	0.70	0.81	0.77	0.87	0.83
	Female Mean (SD) n = 132	115.12 (10.96)	111.26 (20.24)	120.54 (9.97)	119.14 (11.85)	124.24 (8.97)	122.20 (13.34)	127.76 97.53)	127.68 (6.46)	131.82 (5.85)	131.62 (5.84)	135.54 (5.46)	135.74 (5.25)	140.0 (4.15)	140.0 (4.15)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.25	0.23	0.41	0.30	0.56	0.48	0.69	0.69	0.76	0.64	0.83	0.70
4B Flexion in Prone	Combined Mean (SD); n = 198	105.00 (14.10)	104.00 (19.10)	112.00 (13.80)	113.00 (14.30)	117.00 (12.40)	117.00 (13.80)	121.00 (10.90)	122.00 (10.20)	125.00 (9.22)	126.00 (8.93)	130.00 (7.36)	130.00 (7.25)	133.00 (4.68)	133.00 (4.68)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.24	0.26	0.39	0.37	0.52	0.51	0.65	0.60	0.74	0.67	0.80	0.73
	Male Mean (SD); n = 66	109.36 (11.56)	109.27 (12.33)	116.97 (12.64)	116.76 (13.09)	121.27 (11.41)	120.36 (12.43)	125.09 (10.09)	124.85 (10.75)	128.58 (9.22)	128.70 (9.61)	132.03 (8.81)	131.79 (8.91)	134.97 (4.66)	134.97 (4.66)
	p-value	--	--	<0.01	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.09	0.08	0.41	0.41	0.59	0.56	0.68	0.66	0.74	0.72	0.82	0.81
	Female Mean (SD) n = 132	103.29 (14.80)	100.70 (21.22)	109.97 (13.87)	110.77 (14.56)	114.36 (12.32)	114.91 (14.07)	118.61 (10.61)	119.92 (9.51)	123.94 (8.85)	124.88 (8.32)	128.64 (6.25)	128.98 (6.07)	131.95 (4.38)	131.95 (4.38)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.23	0.27	0.38	0.37	0.51	0.51	0.65	0.60	0.74	0.67	0.80	0.72
4C Flexion in Standing	Combined Mean (SD); n = 198	96.10 (12.10)	95.60 (16.10)	108.00 (13.50)	109.00 (12.70)	113.00 (12.20)	114.00 (13.90)	118.00 (9.55)	119.00 (9.55)	124.00 (10.60)	125.00 (7.08)	128.00 (5.96)	129.00 (5.79)	132.00 (4.89)	132.00 (4.89)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.43	0.42	0.57	0.51	0.71	0.66	0.78	0.76	0.86	0.81	0.89	0.83
	Male Mean (SD); n = 66	99.70 (11.70)	100.88 (11.50)	113.09 (13.10)	114.91 (12.44)	116.97 (11.80)	118.64 (11.26)	120.94 (9.46)	121.51 (10.31)	125.76 (8.00)	127.70 (5.63)	129.51 (5.96)	131.12 (4.82)	133.45 (4.19)	133.45 (4.19)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.48	0.51	0.59	0.62	0.71	0.69	0.79	0.83	0.85	0.86	0.89	0.88
	Female Mean (SD) n = 132	94.37 (11.96)	92.94 (17.44)	106.04 (13.05)	106.33 (11.91)	111.14 (12.04)	111.14 (14.37)	117.00 (9.35)	117.77 (9.55)	123.74 11.60)	123.56 (7.34)	127.45 (5.86)	127.89 (5.94)	130.74 (4.98)	130.74 (4.98)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.42	0.41	0.57	0.50	0.73	0.66	0.78	0.75	0.87	0.80	0.89	0.83
4D Extension in Supine	Combined Mean (SD); n = 198	17.00 (1.86)	16.80 (1.51)	15.70 (1.61)	15.50 (1.36)	14.60 (1.33)	14.60 (2.60)	13.50 (1.30)	13.20 (1.23)	12.40 (1.06)	12.10 (1.02)	11.30 (0.81)	11.10 (0.85)	10.10 (0.31)	10.10 (0.31)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.36	0.42	0.59	0.46	0.74	0.80	0.84	0.88	0.89	0.92	0.93	0.95
	Male Mean (SD); n = 66	16.94 (1.42)	16.82 (1.30)	15.76 (1.51)	15.42 (1.19)	14.68 (1.38)	14.27 (1.11)	13.45 (1.29)	13.18 (1.09)	12.36 (1.05)	11.94 (0.99)	11.27 (0.90)	11.01 (0.90)	10.09 (0.38)	10.09 (0.38)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.38	0.49	0.63	0.73	0.79	0.84	0.88	0.90	0.93	0.93	0.96	0.96
	Female Mean (SD) n = 132	17.07 (2.05)	16.80 (1.60)	15.65 (1.66)	15.50 (1.44)	14.62 (1.32)	14.74 (3.07)	13.47 (1.31)	13.21 (1.29)	12.38 (1.07)	12.15 (1.04)	11.30 (0.76)	11.15 (0.82)	10.07 (0.26)	10.07 (0.26)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.36	0.39	0.58	0.39	0.72	0.78	0.82	0.86	0.88	0.91	0.92	0.93
4E Extension in Prone	Combined Mean (SD); n = 198	16.60 (2.05)	16.60 (1.90)	15.50 (1.79)	15.40 (1.81)	14.40 (1.55)	14.40 (2.76)	13.20 (1.47)	12.80 (1.30)	12.10 (1.23)	11.70 (1.09)	11.00 (0.89)	10.80 (0.84)	10.10 (0.24)	10.10 (0.24)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.24	0.26	0.39	0.37	0.52	0.51	0.65	0.60	0.74	0.67	0.80	0.73
	Male Mean (SD); n = 66	16.51 (1.72)	16.57 (1.57)	15.30 (1.54)	15.36 (1.48)	14.18 (1.30)	14.21 (1.28)	12.97 (1.37)	12.97 (1.25)	11.98 (1.22)	11.82 (1.04)	11.00 (1.02)	10.97 (0.94)	10.09 (0.29)	10.09 (0.29)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.30	0.28	0.46	0.41	0.59	0.56	0.68	0.66	0.74	0.72	0.82	0.81
	Female Mean (SD) n = 132	16.70 (2.20)	16.54 (2.05)	15.54 (1.90)	15.37 (1.96)	14.45 (1.66)	14.44 (3.25)	13.29 (1.51)	12.72 (1.31)	12.09 (1.23)	11.68 (1.12)	11.06 (0.82)	10.79 (0.77)	10.04 (0.21)	10.04 (0.21)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.27	0.28	0.50	0.36	0.67	0.74	0.79	0.83	0.86	0.88	0.90	0.91

	Combined Mean	16.40	16.20	15.30	15.10	14.20	14.20	13.00	12.70	11.80	11.80	11.00	10.90	10.10	10.10
	(SD); n = 198	(2.25)	(1.96)	(1.84)	(1.58)	(1.60)	(2.70)	(1.35)	(1.35)	(1.09)	(1.18)	(0.81)	(0.90)	(0.30)	(0.30)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.26	0.30	0.49	0.40	0.68	0.72	0.79	0.81	0.85	0.87	0.89	0.91
4F	Male Mean	16.24	15.88	14.91	14.85	13.85	13.62	12.67	12.45	11.67	11.65	10.86	10.61	10.01	10.01
Extension	(SD); n = 66	(1.65)	(1.50)	(1.06)	(1.27)	(0.83)	(1.04)	(1.01)	(1.02)	(0.88)	(0.77)	(0.74)	(0.69)	(0.09)	(0.09)
in	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Standing	r- value	--	--	0.44	0.35	0.68	0.66	0.80	0.80	0.87	0.87	0.90	0.91	0.94	0.94
	Female Mean	16.44	16.42	15.47	15.26	14.30	14.44	13.14	12.89	11.89	11.85	11.01	11.05	10.11	10.11
	(SD) n = 132	(2.50)	(2.13)	(2.10)	(1.70)	(1.86)	(3.19)	(1.47)	(1.46)	(1.17)	(1.33)	(0.85)	(0.96)	(0.35)	(0.35)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.21	0.29	0.44	0.34	0.63	0.69	0.76	0.79	0.82	0.85	0.87	0.90

and diameter of group of muscles connected with knee joint, 4cm below the patella (DBP) [3E].

KGB

The measurements of KGB for both the knee joints were different as shown in the Table 3A.

In this work, KGB of right knee joint for combined subjects, males and females were 6.25 ± 1.09cms, 6.18 ± 0.85cms and 6.29 ± 1.18cms respectively at the baseline.

The same for combined subjects, males and females were reduced to 2.85 ± 0.52cms, 2.83 ± 0.47cms and 2.86 ± 0.53cms respectively at the end of 42 sittings. The KGB of left knee joint for same categories of patients were 6.34 ± 1.40cms, 6.03 ± 0.70cms and 6.31 ± 1.46cms respectively at the baseline. The same for the identical categories of patients were reduced to 2.85 ± 0.52cms, 2.83 ± 0.47cms and 2.86 ± 0.53cms respectively at the end of 42 sittings. At the same time both the knee joints became symmetrical at the end of 42 sittings in all categories of patients.In case of KGB, the analysis of statistical significant levels for p-values and r-values for 198 combined subjects, 66 male and 132 female patients were calculated comparing with baseline and 7^{th} sitting, 14^{th} sitting, 21^{st} sitting, 28^{th} sitting, 35^{th} sitting and 42^{nd} sitting separately and shown in Table 3A.

DCM

The measurements of DCM for both the legs were different as shown in Table3B. It was observed that DCM of right leg for combined subjects, males and females were 35.70 ± 3.59cms, 35.67 ± 3.93cms and 35.65± 3.41cms respectively at the baseline. The DCM of left leg for combined subjects, males and females were 35.40 ± 4.13cms, and 35.42 ± 3.45cms, 35.45 ± 4.44cms, respectively at the baseline. The DCM of right and left for combined subjects, males and females were both reduced to 35.30 ± 3.36cms, 35.47 ± 3.37cms, and 35.17 ± 3.70cms, respectively and became symmetrical at the end of 42 sittings. In case of DCM, the analysis of statistical significant levels for p-values and r-values for 198 combined subjects, 66 male and 132 female patients were calculated comparing with the baseline and 7^{th} sitting, 14^{th} sitting, 21^{st} sitting, 28^{th} sitting, 35^{th} sitting and 42^{nd} sitting separately and shown in Table 3B.

DTM

The measurements of DTM for both the thighs were different as shown in Table 3C.

In this present study, the DTM of right leg for combined subjects, males and females were 49.69 ± 5.65cms, 47.73 ± 5.10cms and 50.67 ± 5.68cms respectively at the baseline. The DTM of left leg for combined subjects, males and females were 49.40± 6.77cms, 47.86 ± 5.24cms and 50.13 ± 7.31cms respectively at the baseline. The DTM of right and left thighs of combined subjects, males and females were both increased to 49.70 ± 5.70cms, 47.79 ± 4.69cms and 50.58 ± 5.95cms respectively because there was massive muscular wasting in the posterior part of the thigh especially over the vastus lateralis muscle at the baseline. Finally, the diameter of thigh muscles for both the legs became symmetrical at the end of 42 sittings of treatment.

In case of DTM, no significant changes were observed for all the studied sittings, when compared the baseline with 7^{th} sitting, 14^{th} sitting, 21^{st} sitting, 28^{th} sitting, 35^{th} sitting and 42^{nd} sitting for 198 combined subjects, 66 male and 132 female patients separately. But there were improvements of thigh muscles for combined subjects, males and females and they became symmetrical at the end of 42 sittings and shown in Table 3C.

DAP

The measurements of DAP for both the legs were different at the baseline as shown in Table3D.

The present results were showed the DAP of right leg for combined subjects, males and females were 43.50 ± 5.17cms, 41.12 ± 4.10cms and 44.63 ± 5.26cms respectively at the baseline. The DAP of left leg for combined subjects, males and females were 43.11+- 6.02cms, 41.36+-4.13cms and 43.98 ± 6.60cms respectively at the baseline. The DAP of both the legs of combined subjects males and females were continuously reduced to 42.50 ± 4.75cms,40.53 ± 3.92cms, and 43.27 ± 4.93cms respectively over the period of 7sittings internal up to 42 sittings.The reasons were massive inflammation over DAP at the baseline. Finally they became symmetrical at the end of 42 sittings.In case of DAP, the analysis of statistical significant levels for p-values and r-values for 198 combined subjects, 66 male and 132 female patients were calculated comparing with baseline and 7^{th} sitting, 14^{th} sitting, 21^{st} sitting, 28^{th} sitting, 35^{th} sitting and 42^{nd} sitting separately and shown in Table 3D.

DBP

The measurements of DBP for both legs were different at the baseline as shown in Table 3E.

Table 4 The improvements of knee flexion in supine position (4A), in prone position (4B), in standing position (4C), knee extension in supine position (4D), in prone position (4E), in standing position (4F) and their statistical analysis of 198 patients from baseline to 42 sittings in the intervals of 7th sittings having degenerative changes in both knee joints and lumbar region

		Baseline		**7th Sitting**		**14th Sitting**		**21st Sitting**		**28th Sitting**		**35th Sitting**		**42nd Sitting**	
		Rt. Leg	**Lt. Leg**	**Rt. Leg**	**Lt. Leg**	**Rt. Leg**	**Lt. Leg**	**Rt. Leg**	**Lt. Leg**	**Rt. Leg**	**Lt. Leg**	**Rt. Leg**	**Lt. Leg**	**Rt. Leg**	**Lt. Leg**
4A Flexion in Supine	Combined Mean (SD); n = 198	117.00 (10.30)	114.00 (17.80)	122.00 (9.46)	121.00 (11.00)	126.00 (8.28)	124.00 (11.80)	129.00 (7.14)	129.00 (6.38)	133.00 (5.84)	133.00 (5.78)	136.00 (5.16)	136.00 (5.06)	140.00 (3.79)	140.00 (3.79)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.26	0.23	0.43	0.32	0.56	0.48	0.69	0.57	0.77	0.65	0.83	0.71
	Male Mean (SD); n = 66	119.97 (8.05)	119.91 (9.43)	125.03 (7.58)	124.97 (7.58)	128.21 (5.90)	128.36 (6.12)	130.88 (5.78)	131.27 (5.51)	134.27 (5.51)	134.64 (5.11)	137.48 (4.24)	137.79 (4.39)	140.82 (2.89)	140.82 (2.89)
	p-value	--	--	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.31	0.28	0.51	0.47	0.62	0.59	0.72	0.70	0.81	0.77	0.87	0.83
	Female Mean (SD) n = 132	115.12 (10.96)	111.26 (20.24)	120.54 (9.97)	119.14 (11.85)	124.24 (8.97)	122.20 (13.34)	127.76 97.53)	127.68 (6.46)	131.82 (5.85)	131.62 (5.84)	135.54 (5.46)	135.74 (5.25)	140.0 (4.15)	140.0 (4.15)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.25	0.23	0.41	0.30	0.56	0.48	0.69	0.69	0.76	0.64	0.83	0.70
4B Flexion in Prone	Combined Mean (SD); n = 198	105.00 (14.10)	104.00 (19.10)	112.00 (13.80)	113.00 (14.30)	117.00 (12.40)	117.00 (13.80)	121.00 (10.90)	122.00 (10.20)	125.00 (9.22)	126.00 (8.93)	130.00 (7.36)	130.00 (7.25)	133.00 (4.68)	133.00 (4.68)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.24	0.26	0.39	0.37	0.52	0.51	0.65	0.60	0.74	0.67	0.80	0.73
	Male Mean (SD); n = 66	109.36 (11.56)	109.27 (12.33)	116.97 (12.64)	116.76 (13.09)	121.27 (11.41)	120.36 (12.43)	125.09 (10.09)	124.85 (10.75)	128.58 (9.22)	128.70 (9.61)	132.03 (8.81)	131.79 (8.91)	134.97 (4.66)	134.97 (4.66)
	p-value	--	--	<0.01	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.09	0.08	0.41	0.41	0.59	0.56	0.68	0.66	0.74	0.72	0.82	0.81
	Female Mean (SD) n = 132	103.29 (14.80)	100.70 (21.22)	109.97 (13.87)	110.77 (14.56)	114.36 (12.32)	114.91 (14.07)	118.61 (10.61)	119.92 (9.51)	123.94 (8.85)	124.88 (8.32)	128.64 (6.25)	128.98 (6.07)	131.95 (4.38)	131.95 (4.38)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.23	0.27	0.38	0.37	0.51	0.51	0.65	0.60	0.74	0.67	0.80	0.72
4C Flexion in Standing	Combined Mean (SD); n = 198	96.10 (12.10)	95.60 (16.10)	108.00 (13.50)	109.00 (12.70)	113.00 (12.20)	114.00 (13.90)	118.00 (9.55)	119.00 (9.55)	124.00 (10.60)	125.00 (7.08)	128.00 (5.96)	129.00 (5.79)	132.00 (4.89)	132.00 (4.89)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.43	0.42	0.57	0.51	0.71	0.66	0.78	0.76	0.86	0.81	0.89	0.83
	Male Mean (SD); n = 66	99.70 (11.70)	100.88 (11.50)	113.09 (13.10)	114.91 (12.44)	116.97 (11.80)	118.64 (11.26)	120.94 (9.46)	121.51 (10.31)	125.76 (8.00)	127.70 (5.63)	129.51 (5.96)	131.12 (4.82)	133.45 (4.19)	133.45 (4.19)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.48	0.51	0.59	0.62	0.71	0.69	0.79	0.83	0.85	0.86	0.89	0.88
	Female Mean (SD) n = 132	94.37 (11.96)	92.94 (17.44)	106.04 (13.05)	106.33 (11.91)	111.14 (12.04)	111.14 (14.37)	117.00 (9.35)	117.77 (9.55)	123.74 11.60)	123.56 (7.34)	127.45 (5.86)	127.89 (5.94)	130.74 (4.98)	130.74 (4.98)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.42	0.41	0.57	0.50	0.73	0.66	0.78	0.75	0.87	0.80	0.89	0.83
4D Extension in Supine	Combined Mean (SD); n = 198	17.00 (1.86)	16.80 (1.51)	15.70 (1.61)	15.50 (1.36)	14.60 (1.33)	14.60 (2.60)	13.50 (1.30)	13.20 (1.23)	12.40 (1.06)	12.10 (1.02)	11.30 (0.81)	11.10 (0.85)	10.10 (0.31)	10.10 (0.31)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.36	0.42	0.59	0.46	0.74	0.80	0.84	0.88	0.89	0.92	0.93	0.95
	Male Mean (SD); n = 66	16.94 (1.42)	16.82 (1.30)	15.76 (1.51)	15.42 (1.19)	14.68 (1.38)	14.27 (1.11)	13.45 (1.29)	13.18 (1.09)	12.36 (1.05)	11.94 (0.99)	11.27 (0.90)	11.01 (0.90)	10.09 (0.38)	10.09 (0.38)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.38	0.49	0.63	0.73	0.79	0.84	0.88	0.90	0.93	0.93	0.96	0.96
	Female Mean (SD) n = 132	17.07 (2.05)	16.80 (1.60)	15.65 (1.66)	15.50 (1.44)	14.62 (1.32)	14.74 (3.07)	13.47 (1.31)	13.21 (1.29)	12.38 (1.07)	12.15 (1.04)	11.30 (0.76)	11.15 (0.82)	10.07 (0.26)	10.07 (0.26)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.36	0.39	0.58	0.39	0.72	0.78	0.82	0.86	0.88	0.91	0.92	0.93
4E Extension in Prone	Combined Mean (SD); n = 198	16.60 (2.05)	16.60 (1.90)	15.50 (1.79)	15.40 (1.81)	14.40 (1.55)	14.40 (2.76)	13.20 (1.47)	12.80 (1.30)	12.10 (1.23)	11.70 (1.09)	11.00 (0.89)	10.80 (0.84)	10.10 (0.24)	10.10 (0.24)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.24	0.26	0.39	0.37	0.52	0.51	0.65	0.60	0.74	0.67	0.80	0.73
	Male Mean (SD); n = 66	16.51 (1.72)	16.57 (1.57)	15.30 (1.54)	15.36 (1.48)	14.18 (1.30)	14.21 (1.28)	12.97 (1.37)	12.97 (1.25)	11.98 (1.22)	11.82 (1.04)	11.00 (1.02)	10.97 (0.94)	10.09 (0.29)	10.09 (0.29)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.30	0.28	0.46	0.41	0.59	0.56	0.68	0.66	0.74	0.72	0.82	0.81
	Female Mean (SD) n = 132	16.70 (2.20)	16.54 (2.05)	15.54 (1.90)	15.37 (1.96)	14.45 (1.66)	14.44 (3.25)	13.29 (1.51)	12.72 (1.31)	12.09 (1.23)	11.68 (1.12)	11.06 (0.82)	10.79 (0.77)	10.04 (0.21)	10.04 (0.21)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.27	0.28	0.50	0.36	0.67	0.74	0.79	0.83	0.86	0.88	0.90	0.91

4F Extension in Standing	Combined Mean	16.40	16.20	15.30	15.10	14.20	14.20	13.00	12.70	11.80	11.80	11.00	10.90	10.10	10.10
	(SD); n = 198	(2.25)	(1.96)	(1.84)	(1.58)	(1.60)	(2.70)	(1.35)	(1.35)	(1.09)	(1.18)	(0.81)	(0.90)	(0.30)	(0.30)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.26	0.30	0.49	0.40	0.68	0.72	0.79	0.81	0.85	0.87	0.89	0.91
	Male Mean	16.24	15.88	14.91	14.85	13.85	13.62	12.67	12.45	11.67	11.65	10.86	10.61	10.01	10.01
	(SD); n = 66	(1.65)	(1.50)	(1.06)	(1.27)	(0.83)	(1.04)	(1.01)	(1.02)	(0.88)	(0.77)	(0.74)	(0.69)	(0.09)	(0.09)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.44	0.35	0.68	0.66	0.80	0.80	0.87	0.87	0.90	0.91	0.94	0.94
	Female Mean	16.44	16.42	15.47	15.26	14.30	14.44	13.14	12.89	11.89	11.85	11.01	11.05	10.11	10.11
	(SD) n = 132	(2.50)	(2.13)	(2.10)	(1.70)	(1.86)	(3.19)	(1.47)	(1.46)	(1.17)	(1.33)	(0.85)	(0.96)	(0.35)	(0.35)
	p-value	--	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	r- value	--	--	0.21	0.29	0.44	0.34	0.63	0.69	0.76	0.79	0.82	0.85	0.87	0.90

Table 5 Showing the improvements of pain at the baseline and end of forty two sittings measured in WOMAC Index [5A] and New pain reporting scale in multiple joints developed by the author [5B], Biochemical Markers [5C] and body weight in Kg [5D] of One hundred and ninety eight patients having osteoarthritis in both Knee joints and degenerative changes in Lumber region

	Painmeasuring Scale			Baseline (0 sitting)			End of 42 sittings		
				Combine / N= 198 mean (SD)	Male / n=66 mean (SD)	Female / n=132 mean (SD)	Combine / N=198 mean (SD)	Male / n=66 mean (SD)	Female / n=132 mean (SD)
5A	WOMAC INDEX (%)		Pain subscale	78.85 (7.13)	82.25 (7.62)	78.20 (6.80)	23.15 (6.91)	27.00 (5.13)	20.95 (6.63)
			Stiffness subscale	76.75 (12.06)	75.25 (8.63)	77.50 (13.42)	13.15 (10.83)	19.53 (11.99)	11.50 (9.65)
			Phy.function subscale	89.03 (3.21)	89.96 (3.50)	88.56 (2.97)	25.90 (3.30)	28.24 (3.40)	24.77 (2.54)
5B	new pain reporting scale for multiple joints developed by the author (%)	A	Lower back/spine	51 (26%)	16 (31%)	35 (69%)	-	-	-
			Rt leg	28 (14%)	8 (29%)	20 (71%)	-	-	-
			Lt leg	58 (29%)	18 (31%)	40 (69%)	-	-	-
		B	Lower back/spine	22 (11%)	7 (32%)	15 (68%)	-	-	-
			Rt leg	10 (5%)	5 (50%)	5 (50%)	-	-	-
			Lt leg	29 (15%)	12 (41%)	17 (59%)	-	-	-
		C	Lower back/spine	29 (15%)	10 (34%)	19 (66%)	31 (16%)	18 (58%)	13 (42%)
			Rt leg	33 (17%)	14 (42%)	19 (58%)	35 (18%)	12 (34%)	23 (66%)
			Lt leg	24 (12%)	12 (50%)	12 (50%)	28 (14%)	10 (36%)	18 (64%)
		D	Lower back/spine	26 (13%)	9 (35%)	17 (65%)	28 (14%)	12 (45%)	16 (57%)
			Rt leg	22 (11%)	7 (32%)	15 (68%)	25 (13%)	11 (44%)	14 (56%)
			Lt leg	13 (7%)	5 (71%)	8 (29%)	18 (9%)	8 (44%)	10 (56%)
		E	Lower back/spine	70 (35%)	24 (34%)	46 (66%)	139 (70%)	36 (26%)	103 (74%)
			Rt leg	105 (53%)	32 (30%)	73 (70%)	138 (70%)	43 (31%)	95 (69%)
			Lt leg	74 (37%)	19 (26%)	55 (74%)	152 (77%)	48 (32%)	104 (68%)
5C	Biochemical Markers		CRP(mg/l), mean(SD)	7.80 (7.32)	6.74 (6.69)	8.40 (7.58)	3.30 (2.20)	2.80 (2.23)	3.52 (2.16)
			p values	-	-	-	<0.001	<0.001	<0.001
			r values	-	-	-	0.72	0.68	0.74
			CPK(µ/l), mean (SD)	154.30 (149.34)	228.40 (225.00)	117.30 (64.59)	84.83 (36.67)	92.20 (36.70)	81.16 (36.24)
			p values	-	-	-	<0.001	<0.001	<0.001
			r values	-	-	-	0.38	0.21	0.79
			Aldolase(µ/l)	8.40 (2.34)	8.89 (2.25)	8.19 (2.36)	5.90 (1.22)	6.01 (1.00)	5.79 (1.31)
			p values	-	-	-	<0.001	<0.001	<0.001
			r values	-	-	-	0.34	0.43	0.31
5D	BODY WEIGHT (Kg), mean (SD)			70.74 (12.82)	74.45 (13.69)	68.88 (11.99)	65.69 (11.27)	68.67 (11.51)	64.20 (10.88)

Normal range: C-Reactive Protein (with Titra method): upto 6mg/l, CPK (UV Kinetic, DGKC and IFCC): 29.00-133.00(µ/l) andAldolase (Enzymatic with TIM &GDH): 0.3-7.60(µ/l)

The present results were observed that the DBP of right leg for combined subjects, males and females were 35.60 ± 3.73cms, 34.61 ± 2.87cms and 36.15 ± 4.00cms respectively at the baseline. The same for left leg were 35.40 ± 4.47cms, 34.17 ± 2.91cms and 36.06 ± 4.96cms respectively at the baseline.

The DBP for both the legs for combined subjects, males and females were reduced to 35.00 ± 3.29cms, 34.36 ± 2.73cms and 35.28 ± 3.51cms respectively at the end of 42 sittings because there were massive inflammation over DBP at the baseline. Finally these became symmetrical at the end of 42 sittings. In case of DBP, the analysis of statistical levels for p- values and r- values for 198 combined subjects, 66 males and 132 females patients were calculated comparing with baseline and 7^{th}sitting, 14^{th} sitting, 21^{st} sitting, 28^{th} sitting, 35^{th} sitting and 42^{nd} sitting separately and shown in Table 3E.

Flexion in supine, prone and standing position

The difference of measurements of knee flexion in supine position was shown in Table 4A, knee flexion in prone position was shown in Table 4B and knee flexion in standing position was shown in 4C.In the present work,the knee flexions in supine,prone and standing positions of 198 combined subjects (male: 66 and female: 132) were $117.00^0 \pm 10.30^0$ and $114.00^0 \pm 17.80^0$ in supine position, $105.00^0 \pm 14.10^0$ and $104.00^0 \pm 19.10^0$ in prone position and that is standing position were $96.10^0 \pm 12.10^0$ and $95.60^0 \pm 16.10^0$ in right and left legs respectively at the baseline. These were increased to $140^0.00 \pm 3.79^0$ in each right and left legs in supine position, $133.00^0 \pm 4.68^0$ in each leg in prone position and $132.00^0 \pm 4.89^0$ in each leg in standing position at the end of 42 sittings of treatment. At the same time, all the angles of flexions (supine, prone and standing position) were symmetrical at the end of 42 sittings.In

case of knee flexions in supine, prone and standing positions of 66 male patients were $119.97^0 \pm 8.05^0$ and $119.91^0 \pm 9.43^0$ for right and left leg respectively in supine position, in prone position: $109.36^0 \pm 11.56^0$ and $109.27^0 \pm 12.33^0$ for right and left respectively and in standing position: $99.70^0 \pm 11.70^0$ and $100.88^0 \pm 11.50^0$ for right and left respectively at the baseline. These were increased to $140.82^0 \pm 2.89^0$ in each leg in supine position, in prone position: $134.97^0 \pm 4.66^0$in each leg and in the standing position: $133.45^0 \pm 4.19^0$ for each leg at the end of 42 sittings of treatment. In case of knee flexions in supine, prone and standing positions of 132 female patients were $115.12^0 \pm 10.96^0$ and $111.26^0 \pm 20.24^0$ for right and left legs respectively in supine position, in prone position: $103.29^0 \pm 14.80^0$ and $100.70^0 \pm 21.22^0$ in right and left legs respectively and in standing position: $94.37^0 \pm 11.96^0$ and $92.94^0 \pm 17.44^0$ respectively in right and left legs at the baseline.

Figure 3A and 3Bknee joints (right and left legs) before (baseline) and after treatment (42 sitting) (Source: Ganguly, 2015)

Figure 3C and 3Dknee joints (right and left legs) before (baseline) and after treatment (42 sitting) (Source: Ganguly, 2015)

Figure 3E and 3Fknee joints (right and left legs) before (baseline) and after treatment (42 sitting) (Source: Ganguly, 2015)

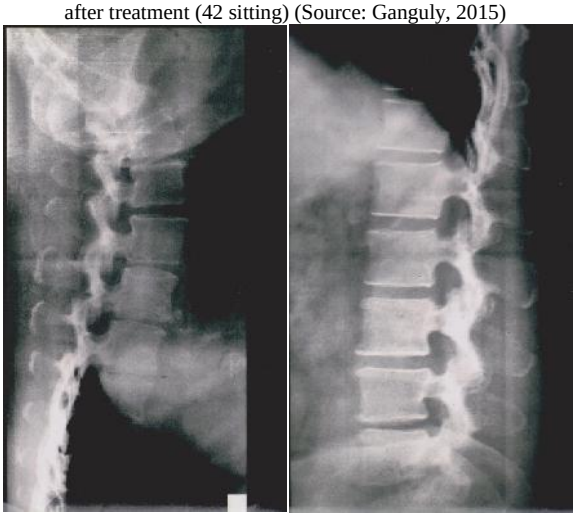

Figure 4A and 4BL.S. of spinebefore (baseline) and after treatment (42 sitting) (Source: Ganguly, 2015)

Figure 4C and 4D L.S. of spinebefore (baseline) and after treatment (42 sitting) (Source: Ganguly, 2015)

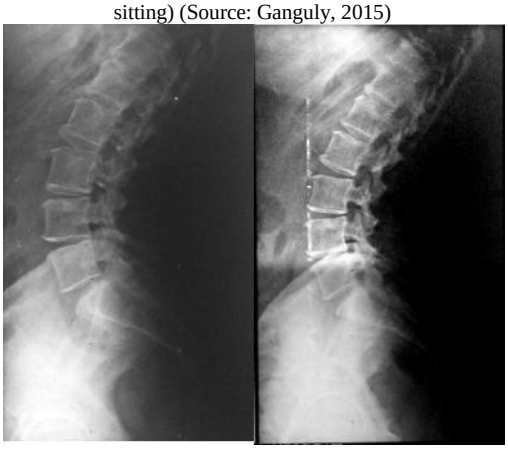

Figure 4E and 4F L.S. of spine before (baseline) and after treatment (42 sitting) (Source: Ganguly, 2015)

These were increased to $140.0^0 \pm 4.15^0$ each for both the legs in supine position, in prone position: $131.95^0 \pm 4.38^0$ for each leg and in standing position: $130.74^0 \pm 4.98^0$ for each leg at the end of 42 sittings of treatment.

In case of knee flexions in supine, prone and standing positions, the analysis of statistical significant levels for p-values and r- values for 198 combined subjects, 66 male and 132 female patients were calculated comparing with baseline and the 7th sitting, 14th sitting, 21st sitting,28th sitting, 35th sitting and 42nd sitting separately and shown in Table 4A- 4C. All the data were considered highly significant level ($P<0.001$) and r (Pearson correlation) values were strong and weak correlation among two variables.

Knee extension in supine, prone and standing positions

The Measurements of knee extension in supine position was shown in Table 4D, the same in prone position was shown in Table 4E and the same in standing position was shown in Table 4F and all were found to be different from each other. In this evaluation, the knee extensions of 198 combined subjects (male:66 and female 132) were $17.00^0 \pm 1.86^0$ and $16.80^0 \pm 1.51^0$ in supine position, $16.60^0 \pm 2.05^0$ and $16.60^0 \pm 1.90^0$ in prone position and $16.40^0 \pm 2.25^0$ and $16.20^0 \pm 1.96^0$ in standing position for right and left leg respectively at the baseline. These were decreased to $10.10^0 \pm 0.31^0$ in each leg in supine position, $10.10^0 \pm 0.24^0$ in each leg in prone position and $10.10^0 \pm 0.30^0$ in each leg in standing position at the end of 42 sittings of treatment. They all become symmetrical at the end of 42 sittings. In case of knee extensions in supine, prone and standing positions of 66 male patients were $16.94^0 \pm 1.42^0$ and $16.82^0 \pm 1.30^0$ for right and left legs respectively in supine position, $16.51^0 \pm 1.72^0$ and $16.57^0 \pm 1.57^0$ for right and left legs respectively in prone position and $16.24^0 \pm 1.65^0$ and $15.88^0 \pm 1.50^0$ for right and left leg respectively in standing position at the base line. These were decreased to $10.09^0 \pm 0.38^0$ for each leg in supine position, $10.09^0 \pm 0.29^0$ for each leg in prone position and $10.01^0 \pm 0.09^0$ for each leg in standing position at the end of 42 sittings.

In case of knee extensions in supine, prone and standing positions of 132 female patients were $17.07^0 \pm 2.05^0$ and $16.80^0 \pm 1.60^0$ for right and left legs respectively in supine position, $16.70^0 \pm 2.20^0$ and $16.54^0 \pm 2.05^0$ for right and left legs respectively in prone position and $16.44^0 \pm 2.50^0$ and $16.42^0 \pm 2.13^0$ for right and left legs respectively in standing position at the base line. These were decreased to $10.07^0 \pm 0.26^0$ for each leg in supine position, $10.04^0 \pm 0.21^0$ for each leg in prone position and $10.11^0 \pm 0.35^0$ for each leg in standing position at the end of 42 sittings of treatment.

In case of knee flexions in supine, prone and standing positions, the analysis of statistical significant levels for p-values and r- values for 198 combined subjects, 66 males and 132 female patients were calculated comparing with baseline and the 7th sitting, 14th sitting, 21st sitting,28th sitting, 35th sitting and 42nd sitting separately and shown in Table 4D - 4F. All the data were considered highly significant ($p<0.001$) level and r-values had weak and strong relation between base value and the values at the end of 42 sittings.

WOMAC Index

The sensation of pain has been calculated for 198 combined subjects, 66 male and 132 female patients separately at the baseline and at the end of 42 sittings of treatment under WOMAC Index in pain subscale (maximum 20 values), stiffness subscale (maximum 8 values) and physical function subscale (maximum 68 values) and shown in Table 5A. The percentage value of pain subscale of 198 combined subjects, 66 male and 132 female patients had been reduced to 23.15%±6.91%, 27.00%±5.13% and 20.95%±6.63% respectively at the end of 42sittings from 78.85%±7.13%, 82.25%±7.62% and 78.20%±6.8% respectively at the baseline.

The percentage value of stiffness subscale of 198 combined subjects, 66 male and 132 female patients had been reduced to 13.15%±10.83%, 19.53%±11.99% and 11.50%±9.65% respectively from 76.75%±12.06%, 75.25%±8.63% and 77.50%±13.42% respectively at the baseline. The percentage value of physical function subscale of 198 combined subjects 66 male and 132 female patients had been reduced to 25.90%±3.30% ,28.24%± 3.40% and 24.77% ± 2.54 % respectively at the end of 42 sittings from 89.03% ±3.21%, 89.96%±3.50% and 88.56%±2.97% respectively at the baseline.

New pain reporting scale

The patients might still feel pain on other joints such as right knee joint or left knee joint or lower back / spine singly or combination as moderately painful (C) or slightly painful (D). The reasons for the same would be the strength of particular muscles had not yet been improved. It might be taken longer period of time. But ultimately the patients would be free from pain as because the patients had achieved the normal levels of anatomical, pathological and radiological features. From the Table5B , we noticed that 29 patients, 33 patients and 24 patients were reporting pain in the lower back/ spine , right knee joint and left knee joint respectively as moderately painful (C) for 198 combined subjects at the baseline. These were increased to 31, 35 and 28 patients respectively for 198 combined subjects at the end of 42 sittings. Moreover, we noticed that 26 patients, 22 patients and 13 patients were reporting pain in the lower back/ spine , right knee joint and left knee joint respectively as slightly painful (D) for 198 combined subjects at the baseline. These were increased to 28, 25and 18 patients respectively for 198 combined subjects at the end of 42 sittings.

Further, it was noticed that 70 patients, 105 patients and 74 patients were reporting as 'no pain'(E) in the lower back/ spine, right knee joint and left knee joint respectively for 198 combined subjects at the baseline. These were increased to 139 patients, 138patients and 152 patients respectively for 198 combined subjects at the end of 42sittings.This scale very helpful for measuring sensation of pain in the multiple joints separately.

Biochemical markers

In this case, the three biochemical markers such as C-reactive protein(CRP), muscle creatine phosphokinase(CPK) and aldolase were examined for 198 combined subjects, 66 male and 132 female patients at the baseline and at the end of 42 sittings of treatment and shown in Table 5C.In this paper, level of CRP for 198 combined subjects, 66 male and 132 female patients were decreased to3.30±2.20mg/l, 2.80±2.23mg/l and 3.52±2.16mg/l respectively at the end of 42sittings of treatment from 7.80±7.32 mg/l, 6.74±6.69 mg/l and 8.40±7.58mg/l respectively at the baseline. The level of CPK for 198 combined subjects, 66 males and 132 females' patients were decreased to 84.83±36.67µ/l, 92.20 ±36.70 µ/l, and 81.16±36.24µ/l respectively at the end of 42 sittings of treatment from 154.30±149.34µ/l, 228.40±225.00µ/l and 117.30±64.59µ/l respectively at the baseline. The level of aldolase for 198 combined subjects, 66 males and 132 females were decreased to 5.90±1.22 µ/l, 6.01±1.00 µ/l and 5.79±1.31 µ/l respectively at the end of 42 sittings from 8.40 ± 2.34 µ/l, 8.89±2.25 µ/l and 8.19 ±2.36 µ/l respectively at the baseline.

All the data were considered to be highly significant (P<0.001). The body weight was taken separately for all 66 males and 132 females at the baseline and at the end of 42 sittings of treatment and shown in Table 5D. The body weights were reduced to 5.05±1.55kgs, for combined subject, 5.78±2.18kgs for males and 4.68±1.11kgs for females at the end of 42 sittings.

The radiological images of knee joints (right and left legs) and L.S. spine of three patients before (at baseline) and three patients after the treatment (42 sitting) were depicted in Figure 3A, 3B, 3C, 3D, 3E and 3F and 4A, 4B, 4C, 4D, 4E and 4F respectively.

DISCUSSION

Researchers have been documented several types of treatment of osteoarthritic patients, which are basically painkillers, hyaluronic acid injection and use of non-steroidal anti-inflammatory medications etc. and also to get relief finally the replacement by surgery (Anon, 1982; Akermark and Forsskahl, 1990; Wynne and Campell, 1994; Silverstein *et al*., 1995; Lin *et al*., 2004) but these drugs have potent risk on gastrointestinal function (Silverstein *et al*., 1995; Gutthann *et al*., 1997). In other words, some studies also documented oral and/or topical application of natural plants alongwith goat bonemarrow for the treatment of backache (Rana and Kasle, 2015) without any anatomical measurements, radiological and biochemical evidences. But the present study in first time was dealt with combined phytoconstiituents from three species of plants. These naturally occurring chemicals were extracted from plants and kept in oil and made paste with the help of wax, which was appliedtopically till 42 sitting. The phytotherapeutic efficacy was noticed by normalization after 42 sitting in comparison with baseline. The present resulthassupported the reasons for not touching the back of the knee joint on the surface of the bed (Ganguly, 2015b).

In another experiment, the author had already established that symmetry between both the legs can be achieved with the help of phytotheraputic treatment protocol, as evident from the anatomical measurements at the end of 42 sittings which were 2-2.5cms each (Ganguly, 2015a). At the same time the removal of compression as well as significant opening up of joint spaces along with marked reduction of the genuverum in both knee joints were achieved (Ganguly, 2015a).It had also evaluated the reasons for mismatched differences of the diameter of calf muscles between the two legs (Ganguly, 2015b). The author had also established that the diameter of calves were symmetrical irrespective of age and sex as well as quantum of damages in both the knees and lumber region had been totally improved as supported by radiological pictures and biochemical reports with the help of topical application of phytoconstituents in specific techniques (Ganguly, 2015a). The reasons for mismatched difference in the diameter of thigh muscles, the author had also been evaluated (Ganguly, 2015b). The author had also established that the diameters of both thighs were symmetrical with the help of topical application of phytoconstituents in specific techniques at the end of 42 sittings (Ganguly, 2015a).

The reasons for mismatched difference of DAP, the author had already been evaluated (Ganguly, 2015b). The author had also established the diameter of group of muscles connected with

knee joint, 4cms above the patella (DAP) were symmetrical with the help of topical application of phytoconstituents in specific techniques at the end of 42 sittings (Ganguly, 2015a). The reasons for mismatched difference, the author had already been evaluated (Ganguly, 2015b).Moreover, the author had already established the symmetry in DBP with the help of phytotherapeutic treatment after 42 sittings (Ganguly, 2015a).

The author already evaluated the reasons for mismatched differences of angle of flexions in supine, prone and standing positions and the conditions of muscles responsible for the same (Ganguly, 2015b). It wasobserved that mismatch difference of angle of extensions in supine, prone and standing positions of different patients were widely different. The author had already evaluated the reasons for mismatched differences of angle of extensions in three positions and the conditions of the muscles responsible for the same (Ganguly, 2015b).

But the author was in doubt while calculating the sensation of pain in right knee joint, left knee joint and lower back/spine separately. It is rather focusing the overall sensation of pain in the body. In order to overcome this doubt, the author has come up with a new pain reporting scale for measuring sensation of pain in multiple joints such as right knee joints, left knee joint and lower back pain / spine (Spector *et al*., 1997).

The author has already established that degenerative changes in lumber region always lead to bilateral degenerative changes in knee joints and vice-versa: sensation of pain cannot only be the parameters of degeneration (Ganguly, 2015a).

Moreover, if there is pain more than one place, the sensation of pain can be felt where the intensity of pain is more because of certain expression of nociceptors conducted to the central nervous system. At the same time, the author had noticed during the continuous 42 sittings of treatment, the patients complained the pain on the other regions, initially there was no pain. This indicated that the intensity of pain had been increased from the baseline by decreasing the original sensation of pain reporting regions at the baseline because of changing effects of the certain expression of nociceptors conducted to the central nervous system at the end of 42 sittings. Although, it is evidenced from the radiological pictures and reports, all biochemical parameters and all anatomical measurements, the patients were being in normal features in anatomically, biologically and radiologically. The author already established with the help of phytotherapeutic treatment protocol, these increase in activities of above biochemical parameters decreased to normal level (Ganguly, 2015b).

CONCLUSION

It was concluded that several researches have been carried out with drugs of having non-steroidal and anti-inflamatory properties (Silverstein *et al*., 1995; Lin *et al*., 2004) and also with the mixture of plant extract and goat bone marrow used to relief pain in osteoarthritis (Rana and Kasle, 2015) but no one has been attempted before on regeneration of muscles and cartilages after 42 days treatment topically with phytoconstituents extract. The present results are in an evidence from anatomical measurements, biochemical parameters and radiological images. Generally damage or deformities lead to degeneration of muscles and nerves. This present treatment procedure makes complete recovery of these situations. While it makes full reversal of compression in lumbar region in back part, it improves the knee part to painless situation in 42 days of sitting of phytotherapeutic treatment. Adjacent muscles and nerves are regenerated from deformity with this therapy. It is postulated that phytoconstitutents may improve knee pain by improving cartilage formation at the articular, hyaline and semilunar levels.

Acknowledgements

The author acknowledges the assistance of AyondeepGanguly and AnondeepGanguly for coordinating and assisting anatomical measurements and completion of data of different observations, radiological and biochemical reports.

Conflicts of interest

The author declares that there is no conflict of interest regarding the publications of this paper.

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How to cite this article:

Apurba Ganguly (2015). Degenerative Changes in Lumbar-Region Occur Simultaneously With Bilateral-Osteoarthritic Changes In Knee-Joints And Vice-Versa: Normalisation With Topical Application of Phytoconstituents By Specialized Techniques Involving Possible Cartilage-Regeneration. *Intl J Recent Sci Res*, 6(9), 6328-6330.

International Journal of Recent Scientific Research

ISSN 0976-3031