12 ANNEXTURES

12.1 Ethical Clearance Certificate

स्वामी विवेकानन्द योग अनुसंधान संस्थान
Swami Vivekananda Yoga Anusandhāna Samsthāna
(Declared as Deemed-to-be University under Section 3 of the UGC Act, 1956)
Eknath Bhavan, # 19, Gavipuram Circle, Kempegowda Nagar, Bangalore - 560 019
Ph: 080 - 2661 2669, Telefax: 080 - 2660 8645
E-mail: svyasa@svyasa.org Website: www.svyasa.org

RES/IEC-SVYASA/16/2013 February 25, 2014

To,

Dr. Neetinakumar Patil
Doctoral Scholar
SVYASA, Yoga University,
Bangalore

Reference:

"Efficacy of integrated Yoga in nursing professionals with Chronic Low Back Pain."Committee Approval of the Above Mentioned Study

Dear Dr. Neetinakumar Patil,
We have received from you the following study related documents vide your letter dated September 19, 2013

1	ProjectProposal
2	Informed consent form

Ethics committee meeting was held on October 20, 2013 at 10 am to 1:00 pm at Eknath Bhavan, Bangalore. Above documents were examined and discussed in the meeting.After due consideration, the committee has decided to approve the conduct of the aforementioned study at Sri Devraj Urs school of Nursing, Kolar, Karnataka and nursing professionals of R L Jalappa Hospital & Research center, Kolar, Karnataka. You also need to obtain necessary approvals from the above said Institution to conduct the project.

APPROVED
INSTITUTIONAL ETHICS COMMITTEE
SVYASA, BANGALORE

स्वामी विवेकानन्द योग अनुसंधान संस्थान
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This is to confirm that neither Dr. Neetinakumar Patil nor any study staff participating in this study were involved in the voting procedures and decision making for these study documents.

The Institutional Review Board / Independent Ethics Committee are expected to be informed about the progress of the study / any changes in the protocol and patient information / informed consent. The investigators are also expected to submit a copy of the final report to IEC for records.

This approval is valid up to the completion of the study at this site.

Please submit to the EC the status report of the study as per EC SOPs.

The EC is organized & operates according to the requirements of ICH – GCP, Indian Council of Medical Research guidelines & Schedule Y.

Best Wishes,

R.S. Venkatesh,
Member Secretary,
Institutional Ethics Committee,
S-VYASA, Bangalore.

12.2 Informed Consent Form

1. INFORMED CONSENT FORM

I ---------- participant does hereby give consent to participate in the study entitled "Efficacy of integrated Yoga in chronic low back pain".

I have been explained that;

1. I have to undergo Surface EMG (Electromyography).
2. I have to answer the questionnaires related to project
3. I do not have to incur any additional expenditure on account of my inclusion into the study.
4. The data generated from my clinical examination and laboratory tests and other reports will be used in the study (which may be subsequently published) without revealing my identity in any manner.
5. I do not suffer any adverse health consequences by my participation in the study.

I affirm that I have been given full information about the purpose of the study and the procedures involved and have been given ample opportunity to clarify my doubts. In giving my consent, I have not faced any coercion. I have been informed that, notwithstanding this consent given, I can withdraw from the study at any stage.

Signature of participant: Place:

Name of participant : Date:

Hospital No :

Contact Person: Dr. Patil NJ
Email:ayushnitin@gmail.com
Mob: +91- 9886211008

12.3 Medical Assessment

This was developed for the current study to acquire socio-demographic details like Personal data, clinical history. Information was collected under the following sections:

5.1 Semi-Structured Interview Schedule

1. Socio-demographic details: Name, Age, Marital status
2. Clinical History:
3. Past History:
4. Obstetric-Gynecological History
5. Personal History
6. Family history:
7. Stress History: Past and present
8. Examination: Height, Weight, Blood Pressure, Pulse Rate, Respiratory Rate, Cardiovascular System, Respiratory System Gastrointestinal System, Nervous System, Spine, SLR (right & left), Tenderness- Para spinal, spine, sacroiliac joints and others,
9. Investigations: X-ray/CT Scan / MRI and Biochemical parameters
10. Observations during the interview
11. Any other relevant information.

12.4 Specific Outcome Measures

12.4.1 Numerical Pain Rating Scale (NPRS)

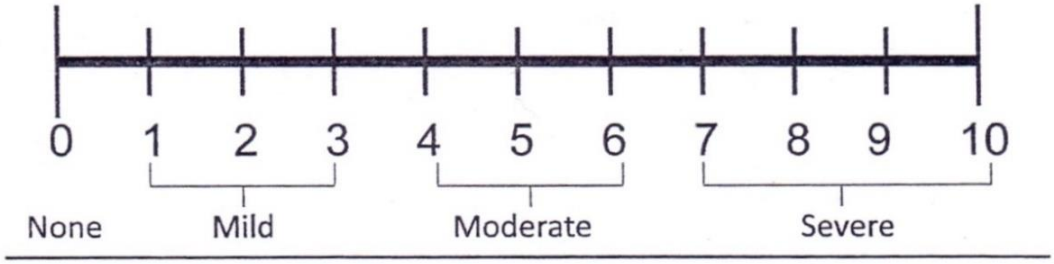
The Numeric Pain Rating Scale Instructions

General Information:

- The patient is asked to make three pain ratings, corresponding to current, best and worst pain experienced over the past 24 hours.
- The average of the 3 ratings was used to represent the patient's level of pain over the previous 24 hours.

Patient Instructions (adopted from (McCaffery, Beebe et al. 1989):

"Please indicate the intensity of current, best, and worst pain levels over the past 24 hours on a scale of 0 (no pain) to 10 (worst pain imaginable)"



Reference:
McCaffery, M., Beebe, A., et al. (1989). Pain: Clinical manual for nursing practice, Mosby St. Louis, MO.

12.4.2 Roland - Morris Disability Questionnaire (RMDQ)

The Roland-Morris Low Back Pain and Disability Questionnaire

Patient name: _____ File #_____ Date:_____

Please read instructions: When your back hurts, you may find it difficult to do some of the things you normally do. Mark only the sentences that describe you today.

- ☐ I stay at home most of the time because of my back.
- ☐ I change position frequently to try to get my back comfortable.
- ☐ I walk more slowly than usual because of my back.
- ☐ Because of my back, I am not doing any jobs that I usually do around the house.
- ☐ Because of my back, I use a handrail to get upstairs.
- ☐ Because of my back, I lie down to rest more often.
- ☐ Because of my back, I have to hold on to something to get out of an easy chair.
- ☐ Because of my back, I try to get other people to do things for me.
- ☐ I get dressed more slowly than usual because of my back.
- ☐ I only stand up for short periods of time because of my back.
- ☐ Because of my back, I try not to bend or kneel down.
- ☐ I find it difficult to get out of a chair because of my back.
- ☐ My back is painful almost all of the time.
- ☐ I find it difficult to turn over in bed because of my back.
- ☐ My appetite is not very good because of my back.
- ☐ I have trouble putting on my sock (or stockings) because of the pain in my back.
- ☐ I can only walk short distances because of my back pain.
- ☐ I sleep less well because of my back.
- ☐ Because of my back pain, I get dressed with the help of someone else.
- ☐ I sit down for most of the day because of my back.
- ☐ I avoid heavy jobs around the house because of my back.
- ☐ Because of back pain, I am more irritable and bad tempered with people than usual.
- ☐ Because of my back, I go upstairs more slowly than usual.
- ☐ I stay in bed most of the time because of my back.

Instructions:

1. The patient is instructed to put a mark next to each appropriate statement.

2. The total number of marked statements are added by the clinician. Unlike the authors of the Oswestry Disability Questionnaire, Roland and Morris did not provide descriptions of the varying degrees of disability (e.g., 40%-60% is severe disability).

3. Clinical improvement over time can be graded based on the analysis of serial questionnaire scores. If, for example, at the beginning of treatment, a patient's score was 12 and, at the conclusion of treatment, her score was 2 (10 points of improvement), we would calculate an 83% (10/12 x 100) improvement.

12.4.3 Fear Avoidance Belief Questionnaire (FABQ)

Patient Name: _____

Fear Avoidance Beliefs Questionnaire (Physical Activity)

Here are some of the things other patients have told us about their pain. For each statement please mark the number from 0-6 to indicate how much physical activities such as bending, lifting, walking or driving affect or would affect your back pain.

	Completely Disagree			Unsure			Completely Agree
My pain was caused by physical activity	0	1	2	3	4	5	6
*Physical activity makes my pain worse	**0**	**1**	**2**	**3**	**4**	**5**	**6**
*Physical activity might harm my back	**0**	**1**	**2**	**3**	**4**	**5**	**6**
*I should not do physical activities which (might) make my pain worse.	**0**	**1**	**2**	**3**	**4**	**5**	**6**
*I cannot do physical activities which (might) make my pain worse	**0**	**1**	**2**	**3**	**4**	**5**	**6**

FABQ(PA) Score: _____ ❑ Greater than 19 ❑ Less than 12 (For * questions only)

Fear Avoidance Beliefs Questionnaire (Work)

The following statements are about how your normal work affects or would affect your back.

	Completely Disagree			Unsure			Completely Agree
*My pain was caused by my work or by an accident at work	**0**	**1**	**2**	**3**	**4**	**5**	**6**
*My work aggravated my pain	**0**	**1**	**2**	**3**	**4**	**5**	**6**
I have a claim for compensation for my pain	0	1	2	3	4	5	6
*My work is too heavy form me	**0**	**1**	**2**	**3**	**4**	**5**	**6**
*My work makes or would make my pain worse	**0**	**1**	**2**	**3**	**4**	**5**	**6**
*My work might harm my back	**0**	**1**	**2**	**3**	**4**	**5**	**6**
*I should not do my regular work with my present pain	**0**	**1**	**2**	**3**	**4**	**5**	**6**
I cannot do my normal work with my present pain	0	1	2	3	4	5	6
I cannot do my normal work with my present pain	0	1	2	3	4	5	6
I cannot do my normal work until my pain is treated	0	1	2	3	4	5	6
*I do not think that I will be back to my normal work within 3 months	**0**	**1**	**2**	**3**	**4**	**5**	**6**

FABQ(W) Score: _____ ❑ Greater than 34 ❑ Less than 19 (For * questions only)

12.4.4 State and Trait Anxiety Inventory

SELF-EVALUATION QUESTIONNAIRE STAI Form Y-1

Please provide the following information:

Name_____ Date_____ S_____

Age_____ Gender (*Circle*) **M** **F** T_____

DIRECTIONS:

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you feel *right* now, that is, *at this moment*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

	NOT AT ALL	SOMEWHAT	MODERATELY SO	VERY MUCH SO
1. I feel calm	1	2	3	4
2. I feel secure	1	2	3	4
3. I am tense	1	2	3	4
4. I feel strained	1	2	3	4
5. I feel at ease	1	2	3	4
6. I feel upset	1	2	3	4
7. I am presently worrying over possible misfortunes	1	2	3	4
8. I feel satisfied	1	2	3	4
9. I feel frightened	1	2	3	4
10. I feel comfortable	1	2	3	4
11. I feel self-confident	1	2	3	4
12. I feel nervous	1	2	3	4
13. I am jittery	1	2	3	4
14. I feel indecisive	1	2	3	4
15. I am relaxed	1	2	3	4
16. I feel content	1	2	3	4
17. I am worried	1	2	3	4
18. I feel confused	1	2	3	4
19. I feel steady	1	2	3	4
20. I feel pleasant	1	2	3	4

SELF-EVALUATION QUESTIONNAIRE

STAI Form Y-2

Name_____Date_____

DIRECTIONS

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you *generally* feel. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally feel.

	ALMOST NEVER	SOMETIMES	OFTEN	ALMOST ALWAYS
21. I feel pleasant	1	2	3	4
22. I feel nervous and restless	1	2	3	4
23. I feel satisfied with myself	1	2	3	4
24. I wish I could be as happy as others seem to be	1	2	3	4
25. I feel like a failure	1	2	3	4
26. I feel rested	1	2	3	4
27. I am "calm, cool, and collected"	1	2	3	4
28. I feel that difficulties are piling up so that I cannot overcome them	1	2	3	4
29. I worry too much over something that really doesn't matter	1	2	3	4
30. I am happy	1	2	3	4
31. I have disturbing thoughts	1	2	3	4
32. I lack self-confidence	1	2	3	4
33. I feel secure	1	2	3	4
34. I make decisions easily	1	2	3	4
35. I feel inadequate	1	2	3	4
36. I am content	1	2	3	4
37. Some unimportant thought runs through my mind and bothers me	1	2	3	4
38. I take disappointments so keenly that I can't put them out of my mind	1	2	3	4
39. I am a steady person	1	2	3	4
40. I get in a state of tension or turmoil as I think over my recent concerns and interests	1	2	3	4

STAIP-AD Test Form Y
www.mindgarden.com

12.4.5 Beck Depression Inventory (BDI)

Beck Depression Inventory

Choose the one statement, from among the group of four statements in each question that best describes how you have been feeling during the past few days. Circle the number beside your choice.

1	0	I do not feel bad.
	1	I feel sad.
	2	I am sad all the time and I can't snap out of it.
	3	I am so sad or unhappy that I cannot stand it.
2	0	I am not particularly discouraged about the future.
	1	I feel discouraged about the future.
	2	I feel I have nothing to look forward to.
	3	I feel that the future is hopeless and that things cannot improve.
3	0	I do not feel like a failure.
	1	I feel I have failed more than the average person.
	2	As I look back on my life, all I can see is a lot of failure.
	3	I feel I am a complete failure as a person.
4	0	I get as much satisfaction out of things as I used to.
	1	I don't enjoy things the way I used to.
	2	I don't get any real satisfaction out of anything anymore.
	3	I am dissatisfied or bored with everything.
5	0	I don't feel particularly guilty.
	1	I feel guilty a good part of the time.
	2	I feel guilty most of the time.
	3	I feel guilty all of the time.
6	0	I don't feel that I am being punished.
	1	I feel I may be punished.
	2	I expect to be punished.
	3	I feel I am being punished.
7	0	I don't feel disappointed in myself.
	1	I am disappointed in myself.
	2	I am disgusted with myself.
	3	I hate myself.
8	0	I don't feel I am worse than anybody else.
	1	I am critical of myself for my weaknesses or mistakes.
	2	I blame myself all the time for faults.
	3	I blame myself for everything bad that happens.
9	0	I don't have any thoughts of killing myself.
	1	I have thoughts of killing myself but I would not carry them out.
	2	I would like to kill myself.
	3	I would kill myself if I had the chance.
10	0	I don't cry anymore than usual.
	1	I cry more now than I used to.
	2	I cry all the time now.
	3	I would kill myself if I had the chance.
11	0	I am not more irritated by things than I ever am.
	1	I am slightly more irritated now than usual.
	2	I am quite annoyed or irritated a good deal of the time.
	3	I feel irritated all the time now.

12	0	I have not lost interest in other people.
	1	I am less interested in other people than I used to be.
	2	I have lost most of my interest in other people.
	3	I have lost all my interest in other people.
13	0	I make decisions about as well as I ever could.
	1	I put off making decisions more than I used to.
	2	I have a greater difficulty in making decisions than before.
	3	I can't make decisions at all anymore.
14	0	I don't feel I look any worse than I used to.
	1	I am worried that I am looking old or unattractive.
	2	I feel that there are permanent changes in my appearance that make me look unattractive.
	3	I believe that I look ugly.
15	0	I can work about as well as before.
	1	It takes an extra effort to get started at doing something.
	2	I have to push myself very hard to do anything.
	3	I can't do any work at all.
16	0	I can sleep as well as usual.
	1	I don't sleep as well as I used to.
	2	I wake up 1-2 hours earlier than usual and find it hard to get back to sleep.
	3	I wake up several hours earlier than I used to and cannot get back to sleep.
17	0	I don't get more tired than usual.
	1	I get tired more easily than I used to.
	2	I get tired from doing almost anything.
	3	I am too tired to do anything.
18	0	My appetite is no worse than usual.
	1	My appetite is not as good as it used to be.
	2	My appetite is much worse now.
	3	I have no appetite at all anymore.
19	0	I haven't lost much weight, if any, lately.
	1	I have lost more than five pounds.
	2	I have lost more than ten pounds.
	3	I have lost more than fifteen pounds trying to lose weight.
		Score 0 if you have been purposely trying to lose weight.
20	0	I am no more worried about my health than usual.
	1	I am worried about my physical problems such as aches and pains or upset stomach.
	2	I am very worried about physical problems and it's hard to think of much else.
	3	I am so worried about my physical problems that I cannot think about anything else.
21	0	I have not noticed any recent change in my interest in sex.
	1	I am less interested in sex.
	2	I am much less interested in sex.
	3	I have lost interest in sex completely.

Please indicate if you have felt any of the following, how often and for what period of time:

- □ Depressed mood
- □ Loss of interest or pleasure in usual activities
- □ Significant change in weight and/or appetite
- □ Insomnia or hypersomnia
- □ Psychomotor agitation or retardation
- □ Increased fatigue and loss of energy
- □ Feelings of self-reproach, worthlessness or inappropriate guilt
- □ Slowed thinking or impaired concentration
- □ Suicide attempt or suicidal ideation

12.4.6 Perceived Stress Scale (PSS)

Perceived Stress Scale

The questions in this scale ask you about your feelings and thoughts **during the last month**. In each case, you will be asked to indicate by circling *how often* you felt or thought a certain way.

Name _____ Date _____

Age _____ Gender (*Circle*): **M F** Other _____

0 = Never 1 = Almost Never 2 = Sometimes 3 = Fairly Often 4 = Very Often

1. In the last month, how often have you been upset because of something that happened unexpectedly?	0	1	2	3	4
2. In the last month, how often have you felt that you were unable to control the important things in your life?	0	1	2	3	4
3. In the last month, how often have you felt nervous and "stressed"?	0	1	2	3	4
4. In the last month, how often have you felt confident about your ability to handle your personal problems?	0	1	2	3	4
5. In the last month, how often have you felt that things were going your way?	0	1	2	3	4
6. In the last month, how often have you found that you could not cope with all the things that you had to do?	0	1	2	3	4
7. In the last month, how often have you been able to control irritations in your life?	0	1	2	3	4
8. In the last month, how often have you felt that you were on top of things?	0	1	2	3	4
9. In the last month, how often have you been angered because of things that were outside of your control?	0	1	2	3	4
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	0	1	2	3	4

Please feel free to use the *Perceived Stress Scale* for your research.

Mind Garden, Inc.
info@mindgarden.com
www.mindgarden.com

References

The PSS Scale is reprinted with permission of the American Sociological Association, from Cohen, S., Kamarck, T., and Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior, 24*, 386-396.

Cohen, S. and Williamson, G. Perceived Stress in a Probability Sample of the United States. Spacapan, S. and Oskamp, S. (Eds.) *The Social Psychology of Health*. Newbury Park, CA: Sage, 1988.

12.4.7 WHOQOL-BRIEF (World Health Questionnaire –Brief version)

WHOQOL-BREF

The following questions ask how you feel about your quality of life, health, or other areas of your life. I will read out each question to you, along with the response options. **Please choose the answer that appears most appropriate.** If you are unsure about which response to give to a question, the first response you think of is often the best one.

Please keep in mind your standards, hopes, pleasures and concerns. We ask that you think about your life **in the last four weeks.**

		Very poor	Poor	Neither poor nor good	Good	Very good
1.	How would you rate your quality of life?	1	2	3	4	5

		Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
2.	How satisfied are you with your health?	1	2	3	4	5

The following questions ask about **how much** you have experienced certain things in the last four weeks.

		Not at all	A little	A moderate amount	Very much	An extreme amount
3.	To what extent do you feel that physical pain prevents you from doing what you need to do?	5	4	3	2	1
4.	How much do you need any medical treatment to function in your daily life?	5	4	3	2	1
5.	How much do you enjoy life?	1	2	3	4	5
6.	To what extent do you feel your life to be meaningful?	1	2	3	4	5

		Not at all	A little	A moderate amount	Very much	Extremely
7.	How well are you able to concentrate?	1	2	3	4	5
8.	How safe do you feel in your daily life?	1	2	3	4	5
9.	How healthy is your physical environment?	1	2	3	4	5

The following questions ask about how completely you experience or were able to do certain things in the last four weeks.

		Not at all	A little	Moderately	Mostly	Completely
10.	Do you have enough energy for everyday life?	1	2	3	4	5
11.	Are you able to accept your bodily appearance?	1	2	3	4	5
12.	Have you enough money to meet your needs?	1	2	3	4	5
13.	How available to you is the information that you need in your day-to-day life?	1	2	3	4	5
14.	To what extent do you have the opportunity for leisure activities?	1	2	3	4	5

		Very poor	Poor	Neither poor nor good	Good	Very good
15.	How well are you able to get around?	1	2	3	4	5

		Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
16.	How satisfied are you with your sleep?	1	2	3	4	5
17.	How satisfied are you with your ability to perform your daily living activities?	1	2	3	4	5
18.	How satisfied are you with your capacity for work?	1	2	3	4	5
19.	How satisfied are you with yourself?	1	2	3	4	5

20.	How satisfied are you with your personal relationships?	1	2	3	4	5
21.	How satisfied are you with your sex life?	1	2	3	4	5
22.	How satisfied are you with the support you get from your friends?	1	2	3	4	5
23.	How satisfied are you with the conditions of your living place?	1	2	3	4	5
24.	How satisfied are you with your access to health services?	1	2	3	4	5
25.	How satisfied are you with your transport?	1	2	3	4	5

The following question refers to how often you have felt or experienced certain things in the last four weeks.

		Never	Seldom	Quite often	Very often	Always
26.	How often do you have negative feelings such as blue mood, despair, anxiety, depression?	5	4	3	2	1

Do you have any comments about the assessment?

_____

_____

[The following table should be completed after the interview is finished]

		Equations for computing domain scores	Raw score	Transformed scores*	
				4-20	0-100
27.	**Domain 1**	(6-Q3) + (6-Q4) + Q10 + Q15 + Q16 + Q17 + Q18 ☐ + ☐ + ☐ + ☐ + ☐ + ☐ + ☐	a. =	b:	c:
28.	**Domain 2**	Q5 + Q6 + Q7 + Q11 + Q19 + (6-Q26) ☐ + ☐ + ☐ + ☐ + ☐ + ☐	a. =	b:	c:
29.	**Domain 3**	Q20 + Q21 + Q22 ☐ + ☐ + ☐	a. =	b:	c:
30.	**Domain 4**	Q8 + Q9 + Q12 + Q13 + Q14 + Q23 + Q24 + Q25 ☐ + ☐ + ☐ + ☐ + ☐ + ☐ + ☐ + ☐	a. =	b:	c:

* See Procedures Manual, pages 13-15

12.5 List of Practices for Yoga Group (IYTM) and Control group

Table No.12.5.1 List of Practices for Yoga group (IYTM)

Integrated yoga module
Supta udarakarshanasana (folded leg lumbar stretch)
Shava udarakarshanasana (crossed leg lumbar stretch)
Pavanamuktasana (wind releasing pose)
Setu bandhasana breathing (bridge pose lumbar stretch)
Vyaghrasana (tiger breathing)
Bhujangasana breathing (serpent pose)
Shalabhasana breathing (locust pose)
Uttanapadasana (straight leg raise pose)
Ardha kati chakrasana (lateral arc pose)
Ardha chakrasana (half wheel pose)
Quick relaxation techniques
Nadi shuddhi (alternate nostril breathing)
Bhramari (humming bee breath)
Nadanusandhana (A, U, M, AUM chanting)
Deep relaxation technique

Integrated Yoga modules for low back pain (Deigned and validated)

1. Folded Legs Lumbar Stretch

Type - I (with one leg)

Practice

***Sthiti*: Supine Posture**

- Lie down on your back with legs together and hands spread sideways at shoulder level.
- Palms are placed firmly pressed on the ground.
- Fold the right leg at the knee, placing the right ankle by the side of the left knee.
- Inhale.
- While exhaling slowly move the right knee to the right side towards the floor, as far as comfortable and simultaneously turn the head to the left as far as you can.
- Then inhaling, raise the right knee up and turn the head back to the center.
- Now, while exhaling move the right knee to the left towards the floor and simultaneously turns the head to the right.
- While inhaling bring back the right knee and the head to the starting position (i.e to the center).
- This is one round
- Repeat the same on the left side i.e., with the left leg folded and right leg straight on the floor.

Type -II (with both legs)

Repeat as in Type -1 with both legs folded.

(For both Stages)

- While practicing with single leg folded, the leg that is straight should remain Undisturbed and remain perpendicular to the ground.
- Synchronize knee movement with breathing.
- Let the shoulders be firm on the ground; do not lift them during the practice.
- Be aware and concentrate on the lumbar region throughout the practice.
- While lowering the knee or knees towards right or left, feel the stretch in the

lumbar region.

- You may feel the stretch in the lumbar region much more in Stage-II than Stage I.
- With continued practice, you will be able to perceive the stretch better with lesser pain.

2. Crossed Legs Lumbar Stretch

Type -I (Right leg crossed over left leg)

Sthiti: **Supine Posture**

Practice

- Lie down on your back with legs together and arms spread sideways at shoulder level, palms facing down and firmly resting on the floor.
- Cross the right leg over the left by bending the legs at the knees and, Wrapping the right foot around the left ankle joint.
- Inhale. While exhaling lower the knees to the right towards the floor, Simultaneously turning the head to the left
- While inhaling bring the knees and the head back to the center.
- Repeat the same on the left side.
- This is one round.

Type -II (Left leg crossed over right leg)

Sthiti**: Supine Posture**

Practice

- Same as in Stage-I, except that now the left leg crosses over the right. Inhale.
- Now repeat the same way as in Type -I.

3. Pavanamuktasana Lumbar Stretch

Sthiti: **Supine Posture.**

Practice

- While inhaling slowly raise the right leg up to 90^0 without bending the knee.

- While exhaling bends the knee, pull it towards the chest with the hands (fingers interlocked) and simultaneously raise the head trying to touch the knee with the forehead.
- Maintain for a while feeling the stretch of the back muscles.
- Then, take the head to ground.
- Inhale stretch up the right leg to 90^0.
- While exhaling lower the right leg to the floor.
- Repeat the same with the left leg.
- This is one round.
- Repeat the same with both legs without lifting the head.

4. Setubandhasana (Lumbar Stretch)

Stage-I (Setubandhasana breathing)

***Sthiti*: Supine Posture**

Practice

- Lie supine with your legs together and hands by the side of the body.
- Fold both the legs placing the heels on the ground near to the buttocks
- While inhaling raise the buttocks and the trunk up as far as you can.
- While exhaling slowly lower them down to the floor.
- This is one round.

Stage-II (*Setubandhäsana* Stretch)

***Sthiti*: for Supine Posture**

- Same as in Stage-I

Practice

- While inhaling slowly raise the buttocks and trunk up and place the hands under the waist to support the body well.

- Then as you exhale, slowly stretch the legs forward by sliding the feet inch by inch.
- Next, while inhaling slowly bend the knees again moving the feet backward inch by inch.
- Finally, while exhaling slowly lower the buttocks and the trunk on the floor.
- This is one round

5. Tiger Breathing

Sthiti: Daëòäsana

Practice

- Sit in Vajräsana.
- Lean forward and place the palms flat on the floor in line with the shoulders with fingers pointing forward. Arms, thighs and heels should be about one shoulder width apart. The arms and thighs are perpendicular to the floor.

- While inhaling raise the head and look at the ceiling.
- At the same time, depress the spine making it concave.
- While exhaling, arch the spine upwards and bend the head downward bringing the chin towards the chest.
- This constitutes one round of tiger breathing

6. *Bhujangasana* Breathing

***Sthiti*: for Prone Posture.**

Practice

- Place the palms near the last rib bone.
- While inhaling raise the head and trunk up to the navel with minimum support of the palms.
- While exhaling slowly bring the trunk and head

back to starting position.

- This is one round.

7. S*alabhasana* Breathing

***Sthiti*: for Prone Posture**

Practice

- Lie down on your abdomen, legs together, hands stretched out over the head and chin on the floor.
- Make fists of your palms with the thumb tucked inside and place them underneath the thighs.

Type -I (*Ardha Salabhasana* breathing)

- While inhaling raise the right leg up as far as comfortable without bending the knee.
- While exhaling return the right leg back on to the floor slowly.
- Repeat with the left leg in the same way.
- This is one round

***Type* -II** (*Salabhasana* breathing)

- While inhaling, this time raise both legs together as far as you can.
- While exhaling bring them back on to the floor slowly.
- This is one round.

8. Straight Leg Raise breathing

***Sthiti*: Supine Posture**

Practice

Stage I: Alternate legs

- While inhaling slowly raise the right leg without bending the knee, as far as comfortable (up to 90^0, if possible).

- While exhaling return the leg to the floor as slowly as possible.
- Repeat the practice with the left leg.
- This is one round.

9. Ardhakati Cakrasana

Sthiti: Tádásana

Practice

- While inhaling, slowly raise the right arm sideways up.
- At the horizontal level turn the palm upwards.
- Continue to raise the arm with deep inhalation vertically until the biceps touches the right ear, palm facing the left side.
- Stretch the right arm upwards.
- While exhaling bend the trunk slowly to the left.
- The left palm slides down along the left thigh as far as possible.
- Do not bend the right elbow or the knees.
- Maintain for about a minute with normal breathing.
- Slowly while coming back to vertical position inhale and stretch the right arm up. Feel the pull along a straight line from the waist up to the fingers.
- Bring the right arm down as you exhale to Sthiti position.
- Come back to Tadasana Sthiti.
- Repeat on the left side, by bending towards the right side.

10. Ardha Cakrasana

Sthiti: Tadasana

Practice

- Support the back at the waist by the palms, fingers pointing forwards.
- Inhale and bend backwards from the lumbar region. Drop the head backwards, stretching the muscles of the neck.

- Maintain for a minute with normal breathing.
- Return to Sthiti.

11. Nadi shuddhi (alternate nostril breathing)

Sthiti: Vajrásana

Practice

- Sit in any meditative posture.
- Adopt Násika Mudrá.
- Close the right nostril with the right thumb and exhale completely through the (left) nostril. Then inhale deeply through the same left nostril.
- Close the left nostril with your ring and little finger of the Násiká Mudrá, release the right nostril. Now exhale slowly and completely through the right nostril.
- Inhale deeply through the same (right) nostril. Then close the right nostril and exhale through the left nostril. This is one round.

12. Nadanusandhana (A, U, M, AUM chanting)

***i).* A- kara chanting**

Sthiti: Vajrásana

- Sit in any meditative posture and adopt cin-mudrá.
- Feel completely relaxed and close your eyes.
- Inhale slowly and completely.
- While exhaling chant 'AAA' in a low pitch.
- Feel the sound resonance in the abdomen and the lower parts of the body.

ii). U- kara chanting

- Sit in any meditative posture.

- Adopt Cinmaya Mudrá.
- Feel the sound resonance in the chest and the middle part of the body.

iii). M- kara chanting

- Sit in any meditative posture.
- Adopt Ádi Mudrá.
- Inhale slowly and completely.
- While exhaling chant 'MMM' in a low pitch.
- Feel the sound resonance in the entire head region

.

***iv)*. A-U-M Chanting**

- Sit in any meditative posture
- Adopt Brahma Mudrá.
- Inhale slowly and completely fill the lungs.
- While exhaling chant 'A-U-M ' in a low pitch.
- Feel the sound resonance throughout the body.

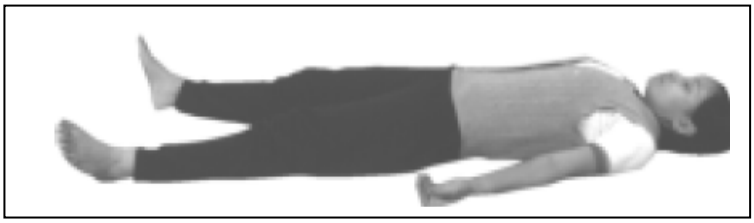
13. Quick Relaxation Technique (QRT)

Sthiti: Savasana

Practice

Phase I

- Feel the abdominal movements. Observe the movements of abdominal muscles going up and down as you breathe in and out normally. Observe 3 cycles.



Phase II

- Synchronize the abdominal movements with deep breathing. Observe 3 cycles.

Phase III

- As you inhale deeply and slowly, energize the body and feel the lightness. As you exhale completely collapse all the muscles, release the tension and enjoy the relaxation. Observe 3 cycles.
- Chant 'AAA' in a low pitch while exhaling. Feel the vibrations in the lower parts of the body.
- Slowly come up from either the right or the left side of the body.

14. **Deep Relaxation Technique (DRT)**

Sthiti: Savásana

Practice

- Gently move your whole body, make yourself comfortable and relax completely.

Phase-I

- Visualization Mental of the lower part of the body from toe to waist step by step and relax… then chant A..A..A.. and feel the vibrations in your lower parts of the body.

Phase-II

- Gently bring your awareness middle part of your body from waist to neck. Visualiza mentally step by step and relax… then chant U•kára and feel the vibration in the middle part of your body.

Phase-III

- Shift your awareness to your head region. Relax the head region part by part (visualize mentally) then chant M•kára feel the vibration in your head region.

Phase-IV

- Observe your whole body from toes to head and relax, chant an A•U•M in a single breath. Feel the resonance throughout the body.

Phase-V

- Slowly come out of the body consciousness and visualize your body lying on the ground completely collapsed.

Phase-VI

- Rotating the body consciousness from body to limitless blue sky. Expand your awareness as vast as the blue sky. Enjoy the infinite bliss. **E..N..J..O..Y..** the blissful state of silence and all-pervasive awareness.

Phase-VII

- Slowly come back to body consciousness. Inhale deeply. Chant an "AUM•kára". Feel the resonance throughout the body.

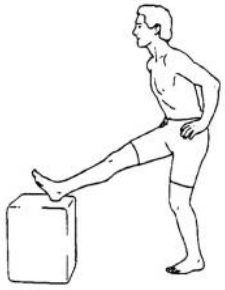
Phase-VIII

- Gently move your whole body a little. Feel the lightness, alertness and movement of energy throughout the body. Slowly bring your legs together and the hands by the side of the body. Turn over to the left or the right side and come up when you are ready.

Table No.12.5.2. List of Practices for control group (Physical exercises)

Physical exercises (Control)
Standing hamstring stretch
Cat and Camel
Pelvic tilt
Partial curl
Piriformis stretch
Extension exercise
Quadriceps leg raising
Trunk rotation
Double knee to chest
Bridging
Hook lying march
Single knee to chest stretch
Lumbar rotation
Press up
Curl ups

1. Standing hamstring stretch



- Stand on right leg with left leg on table/chair.
- Stretch hamstring by slowly bending right knee.
- Hold for 30-45 seconds.
- Repeat with other leg.

2. Cat and Camel

- Begin in a table top position with back flat, knees on the floor, and hands positioned directly under your shoulders. Neck should align with spine.
- Slowly arch spine downward by releasing hips. Press down as far as is comfortable as you exhale.
- Arch back upward by rounding shoulders at the top. Rise up as far as is comfortable as you inhale. Repeat this sequence 5 to 10 times.

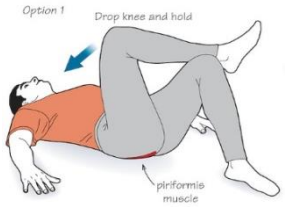
3. Pelvic tilt

- Lie on back with knees bent, feet flat on floor, and arms at sides.
- Flatten small of back against floor. (Hips will tilt upwards).
- Hold for 10 to 15 seconds & release.
- Gradually increase you holding time to 60 seconds.

4. Partial curl

- Lie on the floor on back.
- Keeping arms folded across chest, tilt pelvis to flatten back. Truck chin into chest.
- Tighten abdominal muscles while rising head and shoulder form floor.
- Hold for 10 seconds and release.
- Repeat 10 to 15 times. Gradually increase your repetitions.

5. Piriformis stretch / Single knee to chest



- Lie on the Floor in supine Position
- Cross the leg Over the other knee
- Bring the leg towards the chest and hold it for 10 to 20 sec

6. Extension exercise/Williams Exercise

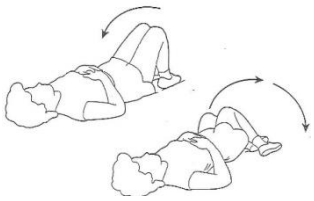
- Lie on your Stomach & place your hands on the floor neat the sides of our head.
- Slowly push your upper body off the floor by straightening your arms, but keep your hips on the floor. Hold for 10 seconds, and

  then relax your arms, moving back to the floor.

7. Quadriceps leg raising

- Lie on the Floor in supine Position
- Lift the leg with knee straight with one leg straight and other on supported leg
- Hold the leg for 20-30 sec and do the repeat for other leg

8. Trunk rotation



- Lie on the floor in supine position keep the hip knee in 90-90 positions
- Rotation of the trunk to either side 8-10 repeats

9. Double knee to chest

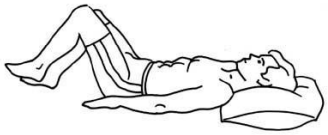
- Lie down on back.
- Pull both knees into chest until you feel a comfortable stretch in lower back.
- Keep the back relaxed.
- Hold for 45 to 60 seconds.

10. Bridging

- Lie flat on back with knees bent, feet planted flat on the floor
- Tighten abdominal and buttock muscles and lift buttocks off the floor.

11. Hook lying march

- The patient lies on his back with his feet flat on the ground with 60 degrees flexion in the knees.



12. Lumbar rotation

- Lie on back.
- Keeping back flat and feet together, rotate knees to one side.
- Hold for 45 to 60 seconds.

14. Press up

- Patient Lie on Supine with Elbow supported
- Raise the head first and followed by upper back raise
- Hold it for 10-20 sec and repeat for 3-5 times

15. Curl ups

- Lie on the floor on back.

- Keeping arms folded across chest, tilt pelvis to flatten back. Truck chin into chest.
- Tighten abdominal muscles while rising head and shoulder form floor.

- Hold for 10 seconds and release.
- Repeat 10 to 15 times. Gradually increase your repetitions.

12.6 Within group and between groups comparison for all Variables

Table No.:12.6.1.. Within group and between groups comparison for all Variables

YOGA (Y)					CONTROL (C)				Y vs C
Variables	**Pre** Mean ± SD	**Post** Mean ± SD	**% Change**	**ES**	**Pre** Mean ± SD	**Post** Mean ± SD	**% Change**	**ES**	**P Value**
NRS	6.09± 0.83	2.25± 1.42	-63.05%	2.599	6.05± 0.608	4.11± 1.039	-31.95%	1.852	<0.001
RMDQ	9.68± 1.55	3.77± 2.36	-61.05%	2.756	9.52± 1.47	7.27± 1.981	-23.63%	1.504	<0.001
FAQ_B	16.39± 1.70	10.18± 2.94	-37.89%	2.079	16.36± 1.313	14.45± 1.982	-11.67%	1.1	<0.001
FAQ_W	21.32± 3.26	13.11± 4.34	-38.51%	2.092	21.11± 2.755	18.7± 3.024	-11.41%	1.382	<0.001
STAI-S	44.34± 3.44	35.07± 4.03	-20.91%	2.182	43.23± 2.844	42.45± 3.231	-1.79%	0.337	<0.001
STAI-T	42.77± 3.18	40.89± 3.04	-4.40%	1.234	41.89± 2.73	41.61± 2.895	-0.65%	0.161	0.025
BDI	11.75± 2.09	6.89± 2.37	-41.36%	1.85	11.86± 1.924	10.84± 2.261	-8.62%	0.859	<0.001
PSS	20.02± 5.30	13.48± 4.81	-32.67%	1.55	20.57± 4.51	18.27± 4.416	-11.16%	1.193	<0.001
LF	44.16± 12.46	40.51± 13.89	-8.27%	0.251	46.59± 15.67	48.33± 14.07	3.72%	-0.099	0.01
HF	29.66± 10.68	33.79± 10.36	13.92%	-0.353	30.36± 10	31.55± 10.75	3.90%	-0.09	0.32
LF/HF	1.69± 0.74	1.26± 0.48	-25.44%	0.752	1.67± 0.78	1.72±0.81	3.03%	-0.076	<0.001
Phy	41.27 ± 6.60	59.48± 9.04	44.12%	-1.547	39.82± 6.655	49.91± 8.575	25.34%	-1.068	<0.001
Psy	34.91± 5.36	68.80± 13.43	97.08%	-2.675	34.93± 7.315	42.23± 7.358	20.88%	-1.048	<0.001
Soc	43.09± 12.42	66.77± 12.00	54.95%	-1.54	44.09± 8.757	50.48± 8.609	14.48%	-0.848	<0.001
Env	55.70± 5.33	57.27± 6.03	2.82%	-0.272	55.84± 5.278	55.89± 5.136	0.08%	-0.008	0.25

Table No.:12.6.2. Within group and between groups' comparison for significance

Paired Samples Test (YOGA& CONTROL)				**Y vs C**
Pairs	Variables	p Value Yoga	p Value Control	**p Value**
Pair 1	Pre_NRS - Post_NRS	<0.001	<0.001	<0.001
Pair 2	Pre_RMDQ - Post_RMDQ	<0.001	<0.001	<0.001
Pair 3	Pre_FAQ_P - Post_FAQ_P	<0.001	<0.001	<0.001
Pair 4	Pre_FAQ_W - Post_FAQ_W	<0.001	<0.001	<0.001
Pair 5	Pre_STAI-S - Post_STAI-S	<0.001	0.031	<0.001
Pair 6	Pre_STAI-T - Post_STAI-T	<0.001	0.290	0.025
Pair 7	Pre_BDI - Post_BDI	<0.001	<0.001	<0.001
Pair 8	Pre_PSS - Post_PSS	<0.001	<0.001	<0.001
Pair 9	Pre_LF - Post_LF	0.103	0.513	0.01
Pair 10	Pre_HF - Post_HF	0.024	0.555	0.32
Pair 11	Pre_LF/HF - Post_LF/HF	<0.001	0.615	<0.001
Pair 12	Phy_Pre_Post	<0.001	<0.001	<0.001
Pair 13	Psy_Pre - Psy_Post	<0.001	<0.001	<0.001
Pair 14	Soc_Pre - Soc_Post	<0.001	<0.001	<0.001
Pair 15	Env_Pre - Env_Post	0.078	0.957	0.25

Table No.:12.6.3. Comparison of baseline data for all variables

Variables		Yoga	Control	p
		Mean ± SD	Mean ± SD	Value
NRS (Pain)		6.09±0.83	6.05±0.608	0.77
RMDQ (Disability)		9.68±1.55	9.52±1.47	0.62
Fear-Avoidance Beliefs Questionnaire (FABQ)	**Physical Activity (p)**	16.39±1.70	16.36±1.313	0.94
	Work(w)	21.32±3.26	21.11±2.755	0.75
State-Trait Anxiety Inventory (STAI)	**State Anxiety**	44.34±3.44	43.23±2.844	0.10
	Trait Anxiety	42.77±3.18	41.89±2.73	0.16
BDI (Depression)		11.75±2.09	11.86±1.924	0.79
PSS (Perceived Stress)		20.02± 5.30	20.57±4.51	0.60
Heat Rate Variability	**LF – Low frequency**	44.16±12.46	46.59±15.67	0.42
	HF – High Frequency	29.66±10.68	30.36±10	0.75
	LF/HF ratio	1.69± 0.74	1.67±0.78	0.87
WHOQOLBREF	**Physical**	41.27 ±6.60	39.82±6.655	0.31
	Psychological	34.91±5.36	34.93±7.315	0.99
	Social	43.09±12.42	44.09±8.757	0.66
	Environmental	55.70±5.33	55.84±5.278	0.90

NRS: Numerical Rating Scale; RMDQ: Roland Morris Disability Questionnaire; FABQp: Fear Avoidance Belief Questionnaire physical; FABQw**:** Fear Avoidance Belief Questionnaire - Work; STAI – State and Trait Anxiety Inventory; BDI; Beck's Depression Inventory; PSS: Perceived Stress Scale

12.7 Actions pics

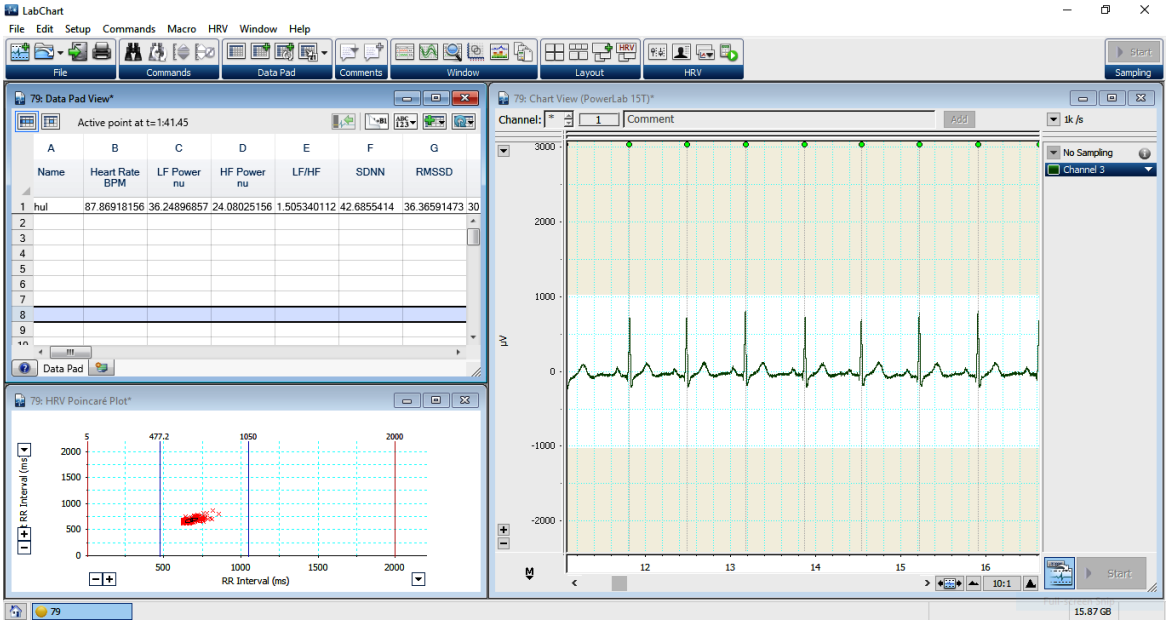


Fig. 12.7.1 HRV analysis by using Labchart (AD instruments)

12.8 List of Publications

1. Patil NJ, Nagarathna R, Tekur P, Patil DN, Nagendra HR, Subramanya P. Designing, validation, and feasibility of integrated yoga therapy module for chronic low back pain. Int J Yoga. 2015 Jul-Dec;8(2):103-8.
2. Patil, N., Patil, D., Tekur, P. Venkatarathnamma PN, Manohar PV. Sciatica (Gridhrasi) - An Ayurveda Perspective. Journal of Ayurveda And Integrated Medical Sciences (ISSN 2456-3110), 2(5), 102 - 112.
3. Patil NJ, Nagaratna R, Tekur P, Manohar P V, Bhargav H, Patil D. A randomized trial comparing effect of yoga and exercises on quality of life among nursing population with chronic low back pain. Int J Yoga 2018;11:208-14
4. Patil NJ, Nagarathna R, Tekur P, Patil D, Nagendra HR. Manohar PV. Effect of Integrated Yoga on pain, functional disability and fear avoidance in Chronic Low Back Pain among female nurses – RCT (**Under review** – Journal of Complimentary and Integrative Medicine)
5. Effect of validated integrated Yoga module on Stress, anxiety and HRV among nurses with chronic Low Back pain. (**Manuscript editing**) – A RCT

1st Publication

Original Article

Designing, validation, and feasibility of integrated yoga therapy module for chronic low back pain

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ABSTRACT

Context: Chronic low back pain (CLBP) is a significant public health problem that has reached epidemic proportions. Yoga therapy has emerged as one of the complementary and alternative therapies for CLBP.

Aim: The present study reports the development, validation, and feasibility of an integrated yoga therapy module (IYTM) for CLBP.

Settings and Design: This study was carried out at the SVYASA Yoga University, Bengaluru, South India. The IYTM for CLBP was designed, validated, and later tested for feasibility in patients with CLBP.

Materials and Methods: In the first phase, IYTM for CLBP was designed based on the literature review of classical texts and recently published research studies. In the second phase, designed IYTM (26 yoga practices) was validated by thirty subject matter (yoga) experts. Content validity ratio (CVR) was analyzed using Lawshe's formula. In the third phase, the validated IYTM (20 yoga practices) was tested on 12 patients for pain, disability and perceived stress at baseline and after 1-month of this intervention.

Results: A total of 20 yoga practices with CVR ≥0.33 were included, 6 yoga practices with CVR ≤0.33 were excluded from the designed IYTM. The feasibility study with validated IYTM showed significant reduction in numerical pain rating scale ($P = 0.02$), Oswestry disability scale ($P = 0.02$), and Perceived Stress Scale ($P = 0.03$).

Conclusion: The designed IYTM was validated by thirty yoga experts and later evaluated on a small sample. This study has shown that the validated IYTM is feasible, had no adverse effects and was useful in alleviating pain, disability, and perceived stress in patients with CLBP. However, randomized control trials with larger sample are needed to strengthen the study.

Key words: Chronic low back pain; content validity ratio; integrated yoga therapy module.

INTRODUCTION

Chronic low back pain (CLBP) defined as back pain lasting >12 weeks. Low back pain (LBP) is a common and costly health problem; 70–80% of adults are afflicted by it at some point of time in their lives,[1,2] expenditures attributed to spine problems were $2580 per person. The CLBP 42% prevalence rate.[3] In addition to the pain, CLBP has also resulted in increased psychological distress,[4] increased disability, and reduced health-related quality of life.[5,6] LBP was identified by the Pan American Health Organization as one of the top three occupational health problems.[7] The complex nature of the CLBP demand multidimensional approach to treatment.[8] There is a wide variety of treatments available for CLBP. A pilot study by Eisenberg *et al.*, showed that, multidisciplinary (integrated) approach, which includes conventional care, complementary, and alternative medicines (CAM) or both is promising in the treatment of patients with persistent LBP.[9]

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In the recent past yoga has emerged as one of the evidence-based CAM in CLBP, which is widely used across the globe. According to national surveys, yoga practice has increased, with over 10 million Americans practicing yoga for health reasons in 2002 and over 13 million in 2007.[10,11] Popularity of yoga has led to several schools of yoga viz.,

Iyengar yoga, Viniyoga, Astanga yoga, Hatha yoga, Laughter yoga, Sudarshana kriya yoga, etc. Stress-related LBP seems to be an appropriate indication for yoga therapy as large number of literature supports the same.[12] Literature review reveals that, Viniyoga, Hatha yoga, Iyengar yoga, and Integrated yoga are the most commonly used forms to treat LBP.[13-15]

In a systematic review, Chou and Huffman found that, yoga therapy is effective for sub-acute or CLBP. In a large sample study of 6 weeks, Viniyoga was found to be superior to conventional exercise. In another review by Posadzki and Ernst which included four randomized controlled trials (RCTs) apart from Chou and Huffman's review, revealed that the intervention of Iyengar and Viniyoga for the period of 12–24 weeks were beneficial in CLBP.[14] Tekur *et al.*, intervened CLBP patients with 7-day intensive residential integrated yoga and found it beneficial for pain, disability, anxiety, stress, and quality of life in patients with CLBP.[15-17] Another review of Cramer *et al.*, found 12 studies meeting inclusion criteria, reported on Viniyoga, Iyengar yoga, and Hatha yoga interventions for CLBP. Ten of these studies were included in the meta-analysis, which strongly favored over control interventions for reducing pain and disability scores.[18]

Different schools of yoga have varying proportions of physical, breathing, and mind activities executed through varied practices. Most of these studies found a varied range of positive benefits on CLBP. These advances have given us a lead to develop a standardized module by extracting the best yoga practices out of different schools of yoga, as they had a common objective *"chitta vritti nirodhah"* (voluntary mastery over the modifications of the mind).[19] The present study report development, validation, and feasibility of validated integrated yoga therapy module (IYTM) for CLBP.

MATERIALS AND METHODS

The designing, validation, and feasibility of IYTM for CLBP [Figure 1] were carried out in the following steps:

First phase: Designing of integrated yoga therapy module for chronic low back pain

Designing the IYTM for CLBP was done by using classical texts,[19-21] recent books on back pain,[22-27] peer-reviewed research publications and other related sources for the development of IYTM for CLBP.[14-18,28-30] Underlying mechanism of the beneficial effects of each yoga practice yet to be explored. Twenty-six yoga practices were tabulated under designed IYTM, which had strong support for beneficial effects on CLBP [Table 1].

Second phase: Validation of integrated yoga therapy module for chronic low back pain

Validation of designed IYTM-26 yoga practices [Table 2] was done with the help of subject matter expert raters (SMEs)/experts, viz. Doctor of Medicine in Yoga, Doctorates in Yoga with minimum experience of 5 years in the field of yoga, and yoga therapists with a masters in Yoga having minimum experience of 7 years after post formal education. Thirty SMEs were consented to participate in the evaluation. They marked content validity on a three (0–2) point scale, viz. Not necessary - 0, Useful but not essential - 1, Essential - 2. After validation, data were analyzed using Lawshe's content validity ratio (CVR).[31]

Third phase: Feasibility study

Twelve patients (5 male and 7 female) with age 36.75 ± 3.79 having nonspecific CLBP who consented to participate in the study were recruited from SVYASA Yoga University, Bengaluru, India. The inclusion criteria were (a) History of CLBP of more than 12 weeks (b) pain in the lumbar spine with or without radiation to legs and (c) age between 18 and 45 years. Exclusion criteria were, (a) CLBP due to organic pathology in the spine, like malignancy (primary or secondary) or chronic infections investigated by X-ray of the lumbar spine.[32] The study was approved by the institutional review board and the ethical committee of the

Table 1: Designed IYTM for CLBP based on literature review

Specific practices
Supta udarakarshanasana (folded leg lumbar stretch)
Shava udarakarshanasana (crossed leg lumbar stretch)
Pavanamuktasana (wind releasing pose)
Setu bandhasana breathing (bridge pose lumbar stretch)
Instant relaxation technique
VyaghraSana (tiger breathing)
Bhujangasana (serpent pose)
Shalabhasana breathing (locust pose),
Shashankasana breathing (moon pose)
Uttanapadasana (straight leg raise pose)
Quick relaxation techniques
Ardha kati chakrasana (lateral arc pose)
Ardha chakrasana (half wheel pose)
Parivrtta trikonasana (revolved triangle pose)
Ustrasana (camel pose)
Vakrasana (twisted pose)
Viparitakarani (half shoulder stand) with wall support
Deep relaxation technique
Vibhagiya pranayama (sectional breathing)
Nadi shuddhi (alternate nostril breathing)
Bhramari (humming bee breath)
Dharana/dhyana (meditation)
Nadanusandhana (A, U, M, AUM chanting)
Om dhyana (Om meditation)
Laghoo shankhaprakshalana (yogic colon cleansing)
Trataka (yogic gazing)

IYTM = Integrated yoga therapy module; CLBP = Chronic low back pain

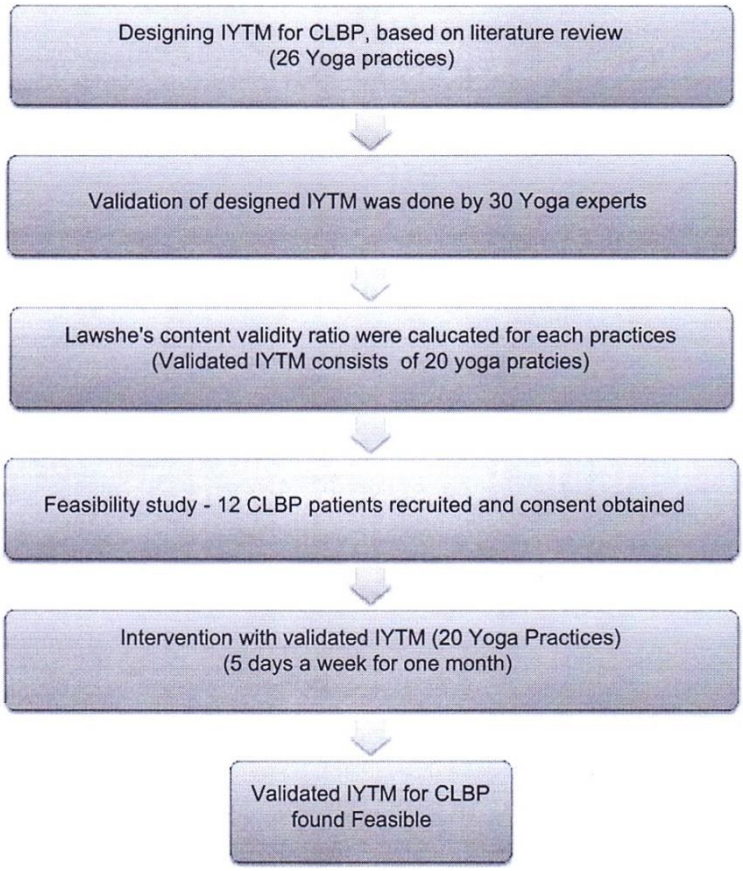

Figure 1: Depicts the steps in the development of the integrated yoga therapy module for chronic low back pain

University. Signed informed consent was obtained from all patients. All the patients have come with X-ray/magnetic resonance imaging/computed tomography, none of them had sciatica. They were intervened with the validated IYTM [Table 3] for 1-month (1 h/day, 5 days a week). Assessed for pain, disability, and perceived stress by using the numerical rating scale (NRS), oswestry disability index (ODI), and perceived stress scale (PSS), respectively at baseline and after 1-month of the intervention. All the 12 patients completed the intervention. There were no adverse effects observed during the study period.

RESULTS

Results: Content validity

30 SMEs validated all the 26 practices of designed IYTM for CLBP. Data were analyzed for content validity using Lawshe's CVR.[31] Lawshe's formula is CVR = $(n_e - N/2)/(N/2)$, where, CVR = Content validity ratio, ne = number of SME panelists indicating "essential," N = Total number of SME panelists, SME. CVR was calculated for all the 26 practices and tabulated [Table 2]. Among them, 20 yoga practices [Table 3] with CVR ≥0.33 were included, 6 yoga practices [Table 4] with CVR ≤0.33 were excluded from designed IYTM. Mean CVR of validated IYTM was 0.7 ± 0.24. As per the Lawshe's CVR ratio the minimum value for 30 SMEs is 0.33, it means the CVR ratio achieved to evaluate the content validity of the IYTM is found to be significant and the validated IYTM is valid to be used as an intervention for CLBP patients.

Results: Feasibility study

Twelve CLBP patients, who consented to the study, were intervened with validated IYTM, which consisted of 20 practices with CVR ≥0.33. Assessments were done at baseline and after 1-month of intervention. All patients

Table 2: Validated IYTM for CLBP with CVR as per Lawshe formula

Specific practices	Ne*	N**	N/2	Ne-N/2	CVR***
Supta udarakarshanasana (folded leg lumbar stretch)	28	30	15	13	0.86
Shava udarakarshanasana (crossed leg lumbar stretch)	28	30	15	13	0.86
Pavanamuktasana (wind releasing pose)	27	30	15	12	0.86
Setu bandhasana breathing (bridge pose lumbar stretch)	30	30	15	15	1.0
Instant relaxation technique	24	30	15	09	0.6
VyaghraSana (tiger breathing)	24	30	15	09	0.6
Bhujangasana (serpent pose)	27	30	15	12	0.8
Shalabhasana breathing (locust pose)	20	30	15	05	0.33
Shashankasana breathing (moon pose)	16	30	15	01	0.06
Uttanapadasana (straight leg raise pose)	20	30	15	05	0.33
Quick relaxation techniques	27	30	15	12	0.8
Ardha kati chakrasana (lateral arc pose)	24	30	15	09	0.6
Ardha chakrasana (half wheel pose)	20	30	15	05	0.33
Parivrtta trikonasana (revolved triangle pose)	10	30	15	−05	−0.33
Ustrasana (camel pose)	17	30	15	02	0.13
Vakrasana (twisted pose)	14	30	15	−01	−0.06
Viparitakarani (half shoulder stand) with wall support	10	30	15	−05	−0.33
Deep relaxation technique	30	30	15	15	1.0
Vibhagiya pranayama (sectional breathing)	25	30	15	10	0.66
Nadi shuddhi (alternate nostril breathing)	30	30	15	15	1.0
Bhramari (humming bee breath)	28	30	15	13	0.86
Dharana/dhyana (meditation)	26	30	15	11	0.73
Nadanusandhana (A, U, M, AUM chanting)	30	30	15	15	1.0
Om Dhyana (Om meditation)	23	30	15	08	0.53
Laghoo shankhaprakshalana (yogic colon cleansing)	20	30	15	05	0.33
Trataka (yogic gazing)	09	30	15	−06	−0.4
Mean	22.58	30	15	7.58	0.61
SD	6.53	0	0	6.53	0.39

*Ne = Total number of essentials for each practice; **N = Total number of panelists; ***CVR = Content validity ratio; IYTM = Integrated yoga therapy module; CLBP = Chronic low back pain; SD = Standard deviation

Table 3: IYTM practices with CVR ≥0.33 need to be retained (validate IYTM)

Name of the practices	CVR
Supta udarakarshanasana (folded leg lumbar stretch)	0.86
Shava udarakarshanasana (crossed leg lumbar stretch)	0.86
Pavanamuktasana (wind releasing pose)	0.86
Setu bandhasana breathing (bridge pose lumbar stretch)	1.0
Instant relaxation technique	0.6
VyaghraSana (tiger breathing)	0.6
Bhujangasana (serpent pose)	0.8
Shalabhasana breathing (locust pose)	0.33
Uttanapadasana (straight leg raise pose)	0.33
Quick relaxation techniques	0.8
Ardha kati chakrasana (lateral arc pose)	0.6
Ardha chakrasana (half wheel pose)	0.33
Deep relaxation technique	1.0
Vibhagiya pranayama (sectional breathing)	0.66
Nadi shuddhi (alternate nostril breathing)	1.0
Bhramari (humming bee breath)	0.86
Dharana/dhyana (meditation)	0.73
Nadanusandhana (A, U, M, AUM chanting)	1.0
Om Dhyana (Om meditation)	0.53
Laghoo shankhaprakshalana (yogic colon cleansing)	0.33
Mean	0.7
SD	0.24

IYTM = Integrated yoga therapy module; SD = Standard deviation; CVR = Content validity ratio

completed the intervention; no adverse effects were noticed during the study. Data were analyzed using Wilcox test, which showed a significant reduction in pain ($P = 0.02$), disability ($P = 0.02$), and perceived stress ($P = 0.03$).

DISCUSSION

This study was planned in three phases viz. (a) designing of IYTM for CLBP (b) validation of IYTM for CLBP by SMEs (c) feasibility study of validated IYTM.

- In the first phase, integrated yoga module for CLBP was designed based on literature reviews of traditional textual references, recent research publications, and advice from yoga experts. Our comprehensive search in traditional yogic texts did not yield any direct references for yogic practices with the ability of improving the CLBP. However, recent Hatha yogic texts[19,20] lay more emphasis on improving health through different yogic practices. In addition to that, recent findings of several schools of yoga in their research studies on CLBP were helped in formulating IYTM for CLBP
- Subject matter (Yoga) experts (SMEs) were involved in the validation process. CVR was calculated for all the 26 practices of designed IYTM. CVR was developed by C. H. Lawshe. It is essentially a method for gauging agreement among raters or judges regarding how essential a particular item is. Lawshe (1975) proposed that each of the SMEs on the judging panel responds to the following question for each item: "Is the skill or knowledge measured by this item "essential," "useful, but not essential" or "not necessary." According to Lawshe, if more than half of the panelists indicate

Table 4: IYTM practices with CVR ≤0.33 need to be deleted/removed

Name of the practices	CVR
Shalabhasana breathing (locust pose)	−0.06
Parivrtta trikonasana (revolved triangle pose)	−0.33
Ustrasana (camel pose)	0.13
Vakrasana (twisted pose)	−0.06
Viparitakarani (half shoulder stand) with wall support	−0.33
Trataka (yogic gazing)	−0.4

IYTM = Integrated yoga therapy module; CVR = Content validity ratio

that an item is essential, that item has at least some content validity. Greater levels of content validity exist as larger numbers of the panelists agree that a particular item is essential. Using these assumptions, Lawshe developed a formula termed the CVR: Lawshe's formula is CVR = $(n_e - N/2)/(N/2)$, where the CVR, number of SME panelists indicating "essential," total number of SME panelists. This formula yields values, which range from +1 to −1; positive values indicate that at least half the SMEs rated the item as essential. The mean CVR across the items may be used as an indicator of overall.

Content validity ratio was calculated for all the 26 practices of designed IYTM. Among them, 20 practices with CVR ≥0. 33 included in the validated IYTM [Table 3]. Other six practices with CVR ≤0.33 viz., Sasankasana breathing (0.06), Parivritta trikonasana (−0.33), Ustrasana/Ardha ustrasana (0.13), Vakrasana/Ardhamastyendrasana (−0.06), Viparitakarani with wall support (−0.33), Trataka (−0.4). These practices were either complimentary poses for an important posture to align the body and mind level. Due to these reasons, most of the experts have not considered them as essential for CLBP. Apart from those 6 practices, all other 20 practices were considered to be essential for CLBP; this made the final CVR ratio satisfy the minimum value as per Lawshe's CVR ratio.

Twelve patients were intervened by validated IYTM (20 practices), and they were assessed pre- and post-intervention for pain (NRS), disability (ODI), and perceived stress (PSS). All three outcome measures, showed statistically significant ($P < 0.005$) positive impact of validated

IYTM on CLBP patients. All 12 patients completed the intervention, there were no adverse effects noticed during the study. In case of nonspecific CLBP, validated IYTM may use as complimentary intervention. However, RCT with larger samples are needed to validate its efficacy as a primary intervention.

CONCLUSION

Integrated yoga therapy module having 26 practices for CLBP, was designed on the basis of literature review, which was validated by 30 Yoga experts. Among 26 yoga practices, 20 were found to be essential (CVR ≥0.33) and 6 not essential (CVR ≤0.33) for CLBP. Feasibility study showed that validated IYTM was found to be beneficial for pain, disability, and perceived stress in patients with CLBP. The present validation brings greater acceptability and better therapy module for CLBP.

LIMITATIONS OF THE STUDY

In the present study, validated IYTM was only tested on a small sample of 12, however, RCTs with the larger sample can become a curtain raiser for future work.

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Sciatica (*Gridhrasi*) - An Ayurveda Perspective

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ABSTRACT

Large number of population suffers from low back pain. Chronic low back pain (CLBP) prevalence increases linearly from the third decade of life on, until the 60 years of age, being more prevalent in women. Sciatica is the most common debilitating condition causes CLBP. Radiating leg pain and related disabilities are the observed in sciatica. Nearly 40% people experience sciatic pain at some point in their life. The diagnosis of sciatica and its management varies considerably within and between countries. Conventional Medicine and surgery are widely used in the management of sciatica. There is radical rise in the use of Complementary and Alternative Medicine (CAM) in patients with sciatica. Ayurveda is one of the widely used CAM in the recent past. Sciatica resembles the disease *Gridharsi* of Ayurveda. *Gridharsi* is one among the *Vataja nanatmaja vyadhi*, where dysfunction of *Vata* affect *gridharsi nadi* characterized by low back pain radiating to lower limbs, stiffness and pricking type of pain. It starts from *kati- prishta* (pelvic region and Lumbosacral) radiating to *jangha paada* (Thigh, Feets) with impairment of lifting the leg. The gait of the person is very similar to vulture *(Gridhra)* hence the name is given as *Gridharsi*. In this article, attempt has been made to review the Ayurvedic classics text and related literatures to understand the disease *Gridharsi* with emphasis on its samprapti on the basis of *Kriyakala* and role of *Shodhana* and *Shamana chikitsa* in the management of *Gridharsi*.

Key words: *Gridhrasi, Sciatica, Vata Vyadhi.*

INTRODUCTION

Modernization and sedentary lifestyle of human being in developing countries has created several disharmonies in biological system. Factors like improper sitting postures in offices, jerky movements in travel and sports lead to the low back pain and sciatica. Low back pain (LBP) is the most frequently reported musculoskeletal problem in elderly adults. LBP due to lumbar disc prolapse is the major cause of morbidity throughout the world. Lifetime incidence of LBP is 50-70 % with incidence of sciatica more than 40%. However clinically significant sciatica due to lumbar disc prolapse occurs in 4-6 % of the population.

The prevalence of sciatica varies considerably ranging from 1.6% in the general population to 43% in a selected working population. Sciatica not only inflicts pain, but also causes difficulty in walking. It negatively impacts quality of life of patient and disturbs daily routine.[1] Sciatica is very painful condition in which pain begins in lumbar region and radiates along the posterior lateral aspects of thigh and leg, in this condition patient walks with difficulty. It occurs because of spinal nerve irritation and characterized by pain in distribution of sciatic nerve. In reference to

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sciatica treatment; medical sciences have only symptomatic management and surgical procedures with interest of adverse reaction.[2] The signs and symptoms are seen in *'Gridhrasi'* can be correlated with 'Sciatica' in modern terminology.

Niruktti of *Gridhrasi*

In Ayurveda, diseases are named by different ways, viz. according to *Dosha - Dushya* involvement, according to symptoms etc. Here the word *Gridhrasi* is suggestive of the typical character of pain and also the gait of the patient.

Gridhra means vulture. Vulture is fond of meat and has a particular fashion of eating meat. It pierces its beak deeply in the flesh and then draws it forcefully, causing severe pain. The pain in *Gridhrasi* is also of the same kind, hence the name is given. Also, because of the persisting severe pain the patient has a typical gait i.e. slightly titled towards the affected side and affected leg in flexed position and another leg extended. This gait resembles with that of vulture.[3]

In this disease the patient walks like the bird *Gridhra* and his legs become tense and slightly curved so due to the resemblance with the gait of a vulture, *Gridhrasi* term might have been given to this disease. *Gridhra* is bird called as vulture in English. This bird is fond of meat and it eats flesh of an animal in such a fashion that he deeply pierces his beak in the flesh then draws it out forcefully. Due to persisting severe pain the patient has a typical gait i.e. slightly titled towards the affected side and affected leg in flexed position and another leg extended. This gait resembles with that of vulture. Such type of pain occurs and typical gait observed in *Gridhrasi*.[4]

Definition

According to *Acharya Charaka*, *'Gridhrasi'* is one among the *'Nanatmaja Vata Vyadhi'*[5] which is characterized by *Stambha* (stiffness), *Ruka* (pain), *Toda* (pricking pain) and *Spandana* (frequent tingling). These symptoms initially affect *Sphika* (buttock) as well as posterior aspect of *Kati* (waist) and then gradually radiates to posterior aspects of *Uru* (thigh), *Janu* (knee), *Jangha* (calf) and *Pada* (foot).[6] According to *Acharya Sushruta,* where two *Kandara* i.e. ligament of heel and all the toes are affected by vitiated *Vata*, So movement of the lower limb get restricted; it is known as *Gridhrasi*.[7] As per *Acharya Harita, Gridhrasi* is a condition originates due to vitiation of *Vyana Vayu* which is responsible for all the types of voluntary movements i.e. expansion, contraction, upward, downward and oblique.[8]

Concept of *Vata* in *Gridharsi*

All *Acharyas* have unanimously accepted the role of *Vata* in causing *Gridhrasi*. The description of *Gridhrasi* in particular is very concise in the classics. Hence by knowing the physiological and pathological aspect of *vata*, will help to understand *Gridhrasi* in better way.[9]

Physiological aspect

The science of Ayurveda revolves around three basic humors of body i.e. *Vata*, *Pitta* and *Kapha*. These three basic factors in their equilibrium, determine the state of health and in the disturbed state of their equilibrium cause disease. These three are the actual intrinsic factors of the disease and hence called *'Tridoshas.'*[10]

Amongst the *Tridoshasa,Vata* is the governing factor of other two *Doshas*, *Dhatus* and *Malas* as their movement in the body depends on *Vata*.[11] *Sushruta* describes that the word *'Vata'* is derived from *'Va'* which signifies *Gati* (motion or movement) and *Gandhan* means to enthuse, to make know, to become aware of induction, effort, to enlighten.[12] Acharya *Charaka* says that *Sharira Vayu* is *Asanghata* and *Anavasthita*. It is responsible for the conduct, regulation and integration of all vital functions and structures of the body.[13] According to Acharya *Sushruta*, *Sharira Vayu* which courses through the body is self-originated, subtle and all pervasive, although invisible in itself, yet, its works are manifested, it abounds in the fundamental quality of *Rajas*, it is instantaneous in action and radiates through the organism in constant currents.[14] The characteristics of 5 types of *Vayu* are *Praspandan*, *Udvahanam*, *Puranam*, *Viveka* and *Dharanam*.[15]

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Pathological aspect

Vata gets vitiated because of over indulgence of the *Dravyas* which are having similar properties as that of *Vata*. The vitiated *Vata* causes various diseases in the body, according to the degree of vitiation and the site where the localization of *Doshas* takes place.[16]

Prakopa Hetus* of *Vata

Various etiological factors for vitiation of *Vata* are mentioned in the classics. The important are ingestion of *Ruksha*, *Sheeta*, *Laghu Aahara*, excessive sexual indulgence, *Prajagarana*, *Upavasa*, excessive activities, physical trauma, excessive walking, *Vegadharana*, carrying heavy weights etc. seasonal variations like *Sheeta*, *Varsha Ritu*, *Jirnanna Kala* etc. are the *Vataprakopaka Hetus*.[17]

Functions of vitiated *Vayu*

When *Vata* is vitiated in the body, it afflicts the body with various disorders and there by affects strength, complexion, happiness and life span, agitates mind, affects all the sense organs, destroys, deforms or detains the embryo for long period, produces fear, grief, confusion, anxiety and excessive delirium and may stop the vital breath.[18]

The symptoms produced by vitiated *Vata* are *Sramsa* (sublaxation), *Bhramsha* (dislocation), *Vyasa* (dilation), *Sanga* (obstruction), *Bheda* (tearing), *Sada* (malaise), *Harsha* (exhilaration), *Trashna* (thirst), *Kampa* (tremor), *Varta* (twisting), *Chala* (movements), *Toda* (pricking pain), *Vyatha* (aching pain), *Chesta* (movement), *Khara* (coarseness), *Parusha* (roughness), *Vishada* (non-sliminess), *Sushira* (porousness), *Arunavarna* (reddish luster), *Kashaya* (astringent taste), *VirasaMukhata* (tastelessness), *Shosha* (wasting), *Shoola* (pain), *Supti* (numbness), *Sankocha* (contraction), *Stambha* (rigidity, stiffness), *Khanja* (lameness) and others.[19]

Acharya Vagbhata has also added *Ushnakamitwa* (affection for heat), *Aanaha* (flatulence), *Malabandha* (constipation), *Nidranasha* (insomnia), *Pralapa* (delirium) and *Deenata* (depressed).[20]

Role of Vata in Gridhrasi

Gridhrasi is one of 80 *Nanatmaja Vatavyadhis* i.e. it is caused only because of vitiated *Vata*. Hence, *Vataprakopaka Lakshanas* like *Shoola*, *Supti*, *Stambha* etc. are found as the cardinal symptoms in the disease. There is no direct mention about *Apana* and *Vyana Vayu* involvement in *Gridhrasi* except that *Harita* has mentioned it in *Vyanaprakopaja* diseases. Depending on the *Sthana* and *Karma*, we can assume that *Apana* and *Vyana Vayu* are involved in causing *Gridhrasi*. In *Gridhrasi*, the *Sthanasamshraya* takes place in *Sphika*, *Kati*, *Pristha* affecting the *Kandara* of leg. Some Anatomical structures can be considered as follows in the involvement of *Gridhrasi*;

Kandara

Kandara is the *Upadhatu* of *Rakta Dhatu*. They are attributed to the function of movements of joints i.e. flexion, extension. *Kandaras* are the *Mahasnayus*.[21] *Sushruta* has also included *Vritta Snayu* under the title of *Kandara*. *Chakrapani* quotes it as *Sthulasnayu*. The total number of *Kandaras* are 16 (4 each in *Hasta*, *Pada*, *Greeva* and *Prishtha)*. Thus, *Rakta* and *Meda Dhatus* form the basis of *Kandara*.

Kati

Shroni and *Kukudmati* are the synonyms for *Kati*. It has *Ashtadashangula Vistara*. It is composed of five *Asthis*. *Kati* is the *Sthana* of *Vayu*. *Apana Vata* resides at *Kati*. *Trikasandhi* forms a part of *Shroni*. *Avalambaka Kapha* bestows strength to *Trika*. *Kati* has *Chestavan Sandhis* which are responsible for movements of lower extremity.[22] *Vatashaya*, *Pakwashaya*, *Mutrashaya* and *Garbhashaya* are situated in the *Kati*. *Kati* is correlated with pelvis or pelvic region.

Prishtha

Sushruta mentioned it as *Pratyanga*.[23] This can be correlated to lumbosacral region.

Sphika

It is the posterior muscular part of *Kati* and is included under *Pratyangas*. It is the *Sthana* of *Meda* as in *Medovriddhi Sphika Lambana* is described. Thus

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Mamsa, *Medadhatu* form the *Sphika*. It can be correlated to gluteal prominence.

Sakthi

Sakthi starts from *Kati* and extends up to *Padanguli*.[24] It is the *Sthana* of *Vayu*. The whole lower limb is included under *Sakthi*.

Janu

The *Sandhi* of *Jangha* and *Uru* is *Janu Sandhi*.[25] It is *Kora* type of *Sandhi* and is a *Vaikalyakara Marma*.

Jangha

The part of leg which lies between *Janu* and *Gulf* is *Jangha*. It is mentioned as *Pratyanga*.[26]

Uru

The part of leg extending from *Vankshana Sandhi* upto *Janu* is *Uru*. It is the *Pratyanga* of *Adhashakha*.[27]

***Samprapti* (Pathogenesis) based on *Shadvidha Krikyakala*[28-31]**

Samprapti of *Gridhrasi* can be understood through the *Shath Krikyakala* (six stage), it is as follows

Chaya

Nidanas leads to accumulation of *Aatmarupa* of *Vayu* i.e. *Ruksha*, *Sheeta*, *Chala Guna* (along with *Kapha* by its *Guru* and *Sheeta* property) in its own place, produces the symptoms of *Chaya*. This is the first stage of *Samprapti*. *Vata* when gets aggravated either due to exposure to factors similar to *Vata* associated with *Ushna* instead of *Sheeta Guna* or due to season or age increase first in its own sites. The condition is called *Chayavastha*. The individual feels aversion to the diet and drinks possessing qualities similar to that of *Vata*. *Sthabdha*, *Purnakoshtata* or a sense of dullness or fullness in the abdomen and *Katistahana* also occurs.

Prakopa

Prakopa is second stage of *Samprapti* in which accumulated *Vata Dosha* tends to become swollen and excited. When no therapies have been adopted to subdue *Vata* at its *Chayavastha* itself and allowed to get aggravated further due to exposure to its aggravating factors it reaches the stage of *Prakopavastha*. There are differences in views pertaining to *Prakopavastha*. According to *Sushruta*, *Prakopavastha* is the 2nd stage of evolutionary process of manifestation of disease and there is four more stage of evolutionary processes. Whereas according to *Vagbhata* and *Charaka* there are only two stage of evolutionary processes of disease i.e. *Chaya* and *Prakopa*. According to them all the five stages of *Kriyakalas* mentioned by *Acharya Sushruta* except *Chaya* will come under the *Prakopa* stage. In the stage of the *Prakopa* the quantity of *Vata* if increased further will be in the maximum quantity at its own sites and is ready to expel. It will cause *Koshtatoda* (sensation of pinning pain) and *Koshta Sancharana* (movement of *Vayu* in abdomen).

Prasaravastha

Prakopa stage is followed by *Prasaravastha* in which the vitiated *Vata* propagates all over the body. This is the third stage of *Samprapti*. Symptoms of *Prasara Prakopa* mentioned in classic can be observed at this stage. When no therapeutic measures have been adopted at the stage of *Prakopa* the *Vata* being expelled from its own sites spread over and extends to other parts, organs and structure of the body. While spreading, *Vata* which possesses the power of locomotion will take lead in spreading other *Doshas* also in general. In the present context also *Vata* may spread itself throughout the body or spread along with *Kapha*. The process is general up to *Prasarvavastha* for all disorder in general. When the *Vata* has not been treated at *Chayavastha* and allowed to expose to its etiological factors and when other conditions are favorable for morbidity it will precede to subsequent stages. In such a stage it is termed as *Chayapoorvaka Prakopa*.

This process will lead to *Gridhrasi* of gradual onset. At times when *Vata* is exposed to its etiological factors more intensively it may directly reach the *Prakopa* stage and immediately pass on to further stage resulting into the sudden manifestation of *Gridhrasi* which is termed as *Achayapoorvaka Prakopa* or sudden onset. The *Dosha Dhatu* vitiation inside the body which makes proper atmosphere for the manifestation of *Gridhrasi* would have been getting evolved for a very long time before its sudden

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manifestation. In this stage, the *Prasaravaistha Vimargagamana* (spreading to other parts) and *Atopa* (painful distension of abdomen, intervertebral disc prolapses) accompanied by rubbing noise of enlargement of particular part are the clinical manifestation by *Vata*.

Sthansamshrayavastha

The previous three stages have been known as stages of *Dosha*. From fourth stage onwards, they are called as stages of the disease. Among later three stages *Sthansamshrayavastha* has the prime importance because interaction between *Dosha* and *Dushya* start to at this stage. If no treatment is adopted even at the stage of *Prasara* the *Dosha* while moving through out the body would settle in the part of the body where there is pre-existing *Khavaigunya* i.e. pre-existing degenerative changes like fibrillation and sequestra formation in the nucleus pulposes and development of fissure in the annulus in general displacement of *Kapha* (nucleus pulposes) resulting in to bulging of posterior longitudinal ligament, enough to touch the dura matter. The premonitory clinical features are only manifested at this stage. This stage is called *Poorvarupavastha*. No specific *Poorvarupas* have been described for *Vatavyadhis* and *Gridhrasi* in particular by *Acharyas* but have stated that the same clinical features will be manifested in an unclear (*Avyaktha*) form in this stage of *Poorvarupa*. In *Gridhrasi*, backache or lumbago are observed to occur in this stage.

It is an important pathological phenomenon which underlines different *Vatavyadhis* and is a result of active vitiation of *VataDosha*. *Gatatva* denotes the *Gati* of vitiated *Vayu* to the place where *Khavaigunya* is available and due to which *Dosha* gets enlodgement there.

During the disease process, in the 4th *Kriyakala* i.e. *Sthansamshraya* is the stage where *Poorvaroopa* are manifested. These prodormal symptoms are produced due to the accumulation of the *Doshas*, at the place of *Kha-vaigunya* i.e. *Kati* and *Guda Pradesh*. Because of the specificity of *Nidana* which produce affinity in *Vata Dosha* for the vitiation of particular *Sthana* or *Dushya*.[28] After this, the *Doshas* get localized in the impaired *Srotas* and pathology is produced, it leads to structural or functional abnormalities in *Adhisthana*, produces a set of symptom.

During *Sthansanshraya Avastha* the vitiated *Dosha* are said to have reached to particular *Sthana* and get obstructed here and intimately mix with and vitiate one, two or more *Dushyas* in that particular portion of body. This is the reason that though *Nidana* of all the *Vatavyadhi* are same but only due to the *Samprapti Vishesha* of disease *Vata* can produce so many *Vata* disorders. If vitiated *Vata* is accumulated in *Kati* and lower extremities by *Srotosanga* it produces *Gridhrasi*.

Vyakta and Bhedavastha

Different abnormalities produced in previous stage leads to production of symptoms of the particular disease is the fifth stage of *Kriya Kala* e.g. *Vyakti*. After *Dosha-Dushya-Sammurcchna* the body channels are impaired by the morbid *Doshas* leading to the production of specific features of the disease, whereas it is collectively known as *Lakshana-Sammucchaya*. On the basis of signs and symptoms diagnosis of the disease is possible. The impairment of *Gridhrasi-nadi* leads to the manifestation of *Gridhrasi* disease. All the *Pratyatma Lakshanas* i.e. cardinal features of *Gridhrasi* pertain to either one *Pada* or both *Padas*. Hence the site manifestation of clinical features i.e. *Vyaktasthana* are *Padas* in general. In bilateral sciatica where bowel and bladder are involved the clinical features of those functions also get manifested. Hence *Mootra* and *Malas* are also to be considered as *Vyakthasthana* rarely in such cases. The movement of one leg is usually impaired in *Gridhrasi*. The movement of the leg is controlled by *Gridhrasinadi* together, its branches and some other *Nadis* of lumbo-sacral plexus. Each movement is controlled by two spinal segments.

Curability and incurability of the disease depends upon the severity of the presenting symptoms. This is the unique stage of the illness, where in it is clearly recognizable as all its characteristic signs and symptoms manifest. At this stage *Gridhrasi* gets manifested completely and can be distinguished

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according to *Doshik* predominance as *Vataja* type or *Vatakaphja* type.

Dhatukshaya and *Margavarnajanya Samprapti* of *Gridhrasi*

The actual manifestation of the disease occurs when the circulating vitiated *Doshas* get accumulated where *Khavaigunya* is already present. There are two main reasons by which *Vata* get vitiated. They are *Dhatukshaya* and *Margavarodha*. Because of the *Samprapti Vishesha*, the same *Nidanas* produce different *Vatavyadhis*. This is because the presentation of the disease changes according to the *Sthana* where *Dosha-Dushya Sammurchhana* takes place. *Khavaigunya* plays an important role in the disease process. In Gridhrasi, exposure to mild but continuous trauma to *Kati, Sphika* region because of improper posture, travelling in jerky vehicles, carrying heavy loads, digging etc. or sometimes spinal cord injury, improperly treated pelvic diseases are responsible for producing *Sthanavaigunya* at *Kati, Sphika, Prishta* etc. They may not be able to produce the disease at the instance, but after acquiring some *Vyanjaka Hetu* (exciting cause), the disease may be produced. Here, the *Samprapti* takes place either by *Apatarpana* or *Santarpana* or *Agantuja*.

In the state of *Apatarpana*, all the *Dhatus* viz. *Rasa, Rakta, Mamsa* etc. are subjected to *Kshaya*. This *Dhatukshaya* results into the aggravation of *Vata* and this vitiated *Vata* fills up the empty *Srotasas* ultimately causing *Vatavyadhi*. Due to *Rukshadi Aaharas*, firstly the *Rasa Dhatu Kshaya* takes place and it leads to further *Dhatukshaya*, involving *Mamsa, Meda, Asthi, Majja* etc.

And another type of *Samprapti* occurs due to *Santarpanaoktha Nidana Sevana* causing *Margavrodha*. Here *Kapha* is found as *Anubandhi Dosha* along with *Vata*. *Atibhojan, Diwaswapa* etc. are the factors responsible for this kind of *Samprapti*. Deranged *Jatharagni* leads to formation of *Ama*. *Ama* produces obstruction to the normal *Gati* of *Vata*. To overcome the resistance *Vata* attempts to function hyperdyanamically. This leads to *Vataprakopa*, also when *Amasamshrista Vayu* resides at *Kati, Prishtha* etc. *Gridhrasi* may be produced. *Lakshanas* like *Tandra, Gaurav, Agnimandya* etc. are observed due to involvement of *Kapha* and *Ama*. Impaired *Dhatwagni* may lead to the production of *Adhyasthi, Arbuda, Granthi* etc. i.e. *Apachita Dhatus*. If they cause *Avarodha* in the *Vatavaha Nadi* of the lower limb, *Gridhrasi* may be produced.

Bahyaabhighata like *Agantuja* factors are responsible for the *'Achayapurvaka Prakopa'* of *Doshas*. *Abhighata* leads to *Dhatukshaya* directly and *Vata* provocation is liable to occur. The vitiated *Vata* may directly intermingle with *Asthi, Majja Dhatu* to produce *Gridhrasi*.

Mamsa and *Meda Dhatu* are *Snigdha, Guru Dhatu*. *Rukshadi Aahara* hampers the process of their *Poshan* leading to *Mamsa* and *Medakshaya*. Also *Sphika* is *Mamsa Pradhan Avayava*. *Sphika Shushkata* is mentioned in *Mamsakshaya Lakshana*. *Rukshata* at *Mamsa Dhatu* produces *Stambha* in the muscles of lower limb restricting its movement.[32]

In the *Lakshanas* of *Asthi, Meda* and *Mamsa Kshaya, Sandhishunyata, Sandhi Shaithilya* and in *Asthi* and *Majja Kshaya, Asthi Saushirya, Asthi Daurbalya* and *Laghuta* are described. All these *Dhatukshaya Lakshanas* can be correlated to degenerative changes specifically in bone e.g. osteomalacia, osteoporosis, spondylosis, tuberculosis etc.

Chikitsa Siddhanta (line of treatment) of *Gridhrasi (Vatavyadhi)*

Nidana Parivarjana (avoidance of causative factors), is the first and foremost principle to be adopted in the treatment. Secondly the intensity of the *Dosha Prakopa* should be considered before deciding the line of treatment.If the *Dosha prakopa* is minimum *Langhana Chikitsa* is enough, if the intensity of *Dosha prakopa* is moderate then *Langhana* and *Pachana* treatment should be given. If, *Doshas* are in *Prakopa avastha, Shodhana* treatment should be decided.[33]

Vishishta Chikitsa for *Gridhrasi*

The effective treatment of *Gridhrasi* cannot be unified, as the pathology involves multiple varying

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factors. Vitiated *Vata* and association of *Kapha Dosha* coming out from the *Pakwashaya*, afflicting the *Asthi Dhatu* vitiating *Snayu* and *Kandara* affecting in the *Asthi* produces the illness. Therefore, the procedures mainly aimed at the modification of the imbalances of *Vata Dosha* as well as *Kapha Dosha*. Thus, the unique pathogenesis eases the planning of the treatment in case of *Vataja Gridhrasi*. But in case of *Vatakaphaja Gridhrasi*, the final treatment planned should pacify the *Vata* as well as *Kapha Dosha* effectively.

With consideration of this, following principles of treatment are advocated in the *Ayurvedic* classics;

Treatment	Ch	Su	AH	BP	YR	HS	BS	CD
Snehana	-	-	-	-	-	+	+	+
Swedana	-	-	-	-	-	+	-	+
Vamana	-	-	-	+	-	-	-	+
Virechana	-	-	-	+	-	-	-	+
Niruha Basti	+	-	-	-	-	-	-	-
Anuvasana Basti	+	-	+	+	+	-	+	+
Siravyedha	+	+	+	-	+	-	-	+
Raktamokshana	-	-	-	-	-	+	+	-
Agnikarma	+	-	+	-	+	+	-	+
Shastrakarma	-	-	-	-	-	-	-	+

Ch - Charaka; Su - Sushrutha; A.H.- Astanga Hrudaya; B.P. - Bhava Prakash; Y.R. - Yoga Ratnakara; H.S. - Haritha Samhitha; B.S - Bhela Samhitha; C.D. - Cakradatta

1. Snehana

Snehana or oleation therapy is used externally and internally. In *Gridhrasi* external *Snehana* may be performed in the form of *Abhyanga*, *Pizhichhil*, *Avagaha*, *Parisheka* etc. One should remember that if the *Kapha Dosha* is involved in the pathogenesis as in case of *Vatakaphaja Gridhrasi*, *Snehana Chikitsa* should be restricted as this treatment tends to worsen the imbalance of *Kapha Dosha*.[34]

2. Swedana

Shula and *Stambha* in the lower extremities are the cardinal symptoms of *Gridhrasi* and best treated by the *Swedana Chikitsa*. *Swedana* also helps in the liquefaction of the *Dosha* there by assisting clearing the *Srotas* or else rectifying the *Margaavarana*.

Among the different forms of *Swedana* procedures, *Avagaha Sweda*, *Pizhiccil*, *Nadi Sweda*, *Patrapinda Sweda*, *Pinda Sweda* and *Upanaha Sweda* may be efficiently performed in patients of *Gridhrasi*. But in *Vatakaphaja Gridhrasi*, *Baluka Sweda* is a better option for evident reasons.[35]

3. Vamana

After the *Snehana* and *Swedana*, *Shodhana* is indicated in *Gridhrasi*. The authors like *Chakrapani* and *Bhavamishra* opine that without *Shodhana* of body, *Basti Chikitsa* will not give desired effect in patients of *Gridhrasi Shodhana* in the form of *Vamana* is advised in patients suffering *Gridhrasi* and is specially preferred in *Vatakaphaja Gridhrasi* for evident reasons.[36]

4. Virechana

Virechana has an important role in *Gridhrasi*. The action of *Virechana* is not only limited to particular site; it has effects on the whole body. In *Vatavyadhi* most of the authors mentioned *Mridu Virechana*. Oral administration of *'Eranda Sneha'* along with milk is ideal for the *Virechana* purpose. This will help in both *Vata Anulomana* as well as smooth excretion of *Mala*. The *Sneha Virechana* clears obstruction in the *Srotas* and relieves *Vata* vitiation very quickly. Thus *Sneha Virechana* of *Mridu* nature helps in controlling *Shula* in *Gridhrasi*.[37]

5. Basti

Pakwashaya is the primary location of *Vata Dosha*. It is true that *Vyana Vata* is vitiated in *Gridhrasi*. So, *Basti* is very helpful in pacifying *Vata*, further it is described that *Basti Chikitsa* as *'Ardha Chikitsa'* or *'Purna Chikitsa'* of *Vata*. By these facts, *Basti* is most

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important among the *Panchakarma* in the treatment of *Gridhrasi.* No other *Chikitsa* has the capacity to pacify and regulate the force of Vata apart from *Basti.* Any type of *Basti* can be adopted but, initially one should purify the body by *Shodhana Karma* to get the desired effect.[38]

- *Niruha Basti - Niruha Basti* like *Erandamuladi Niruha* and *Dashamuladi Niruha* are the best choices.
- *Anuvasana Basti - Anuvasana Basti* using *Vatahara Tailas* like *Bala Taila, Mulaka Taila, Ksheerabala Taila, Prasarani Taila* etc. are beneficial.

6. Siravyedha

Acharya Charaka explained *Siravyedha* at the site of *Antara-Kandara Gulpha*. Acharya *Sushruta* and *Vagbhata* indicated *Siravyedha* four *Angula* above and four *Angula* below at the site of knee joint.

7. Raktamokshana

It is a general rule that, when the regular treatment with *Shadvidhopakrama* fails to give any relief in any disease, one should consider the involvement of *Rakta Dhatu* in the pathogenesis and is best treated by *Raktamokshana*. This rule is also applicable in *Gridhrasi Roga*. As the disease *Gridhrasi* is characterized by affliction of *Rakta* along with *Vata*, several authors have advised *Raktamokshana*.[39]

8. Agnikarma

Various *Acharyas* mentioned *Agnikarma* in the management of *Gridhrasi*. According to *Sushruta* and *Vagbhata*, in the management of *Sira, Snayu, Asthi* and *Sandhigata Vyadhi, Agnikarma* is indicated and *Gridhrasi* is one of the diseases of these *Samprapti*.[40]

For treatment of *Gridhrasi*, different site for *Agnikarma* are as mentioned below,

- *Charaka* : *Antara Kandara Gulpha*
- *Chakradatta*: *Pada Kanistika Anguli* (little toe of the affected leg).
- *Harita*: Four *Angula* above the *Gulpha* in *Tiryak Gati*.

9. Shastra-Karma

Chakradatta has given the treatment of *Gridhrasi* in details. He has mentioned a small operation with prior *Snehana* and *Swedana* to remove *Granthi* in *Gridhrasi* and also *Siravedha* four *Angula* below *Indrabasti Marma*.

Shamana Chikitsa

Following *Chikitsa* can be included under *Shamana Chikitsa*,

1. *Vedanashamaka Chikitsa* - To pacify the severity of pain.
2. *Vatahara Chikitsa* - Elimination of vitiated *Vata Dosha*.
3. *Kaphahara Chikitsa* - Pacification of vitiated *Kapha Dosha*.
4. *Deepana and Pachana Chikitsa* - To balance the *Agni*

- *Vedanashamaka Chikitsa*

Though no any treatments are describing such a classification but if we go through the recent texts, many *Vedanashamaka* combinations are prescribed in *Gridhrasi* that probably contain *Kupilu*, or *Guggulu*. As pain is one of the cardinal symptoms in *Gridhrasi*, these medications may be effectively prescribed.

- *Vatahara Chikitsa*

As mentioned earlier, *Vatahara Chikitsa* is the primary line of treatment in *Gridhrasi.* It includes both *Shamana* and *Shodhana* procedures. This is the unique principle of treatment in *Vataja Gridhrasi*.

- *Kaphahara Chikitsa*

When the *Gridhrasi* is caused due to vitiated *Vata Dosha* in association with *Kapha Dosha*, addition of *Kaphahara Chikitsa* forms the complete treatment. Planning of both *Vatahara* and *Kaphahara Chikitsa* simultaneously may not be easy as the individual treatment of *Vata Dosha* and *Kapha Dosha* is mutually

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contradictory. Combinations containing *Guggulu* and *Shodhit Kupeelu* are the best in such conditions as it acts both on *Vata* and *Kapha*.

- *Deepana and Pachana Chikitsa*

In *Shamana Chikitsa*, *Deepana* and *Pachana Chikitsa* is most useful to destroy the *Ama* and to maintain the equilibrium of the *Agni*, thus achieving the physical harmony. *Acharya Chakradatta* have described in the context of *Amavata Rogadhikara*, *Ajamodadivati* in the case of *Ugra Gridhrasi*.

Pathya Apathya

Pathya

Those *Aharadi Dravyas*, which are beneficial to *Srotas* and have no adverse effect on body and mind are termed as *Pathya*. *Pathya* is a major to support the line of treatment of any disease; separately *Pathya* and *Apathya* of *Gridhrasi* are not described in classical texts. Hence *Pathya* and *Apathya* of *Vata Vyadhi* in general can be applied for patients of *Gridhrasi*.

Aahara

- *Anna Varga : Kulathi, Masha, Godhuma, Raktashali, Navina Tila, Purana Shalyodana.*
- *Phala Varga : Amla, Rasayukta Phala, Dadima, Draksha, Jambira, Badara.*
- *Shaka Varga : Patola, Shigru, Rasona.*
- *Dugdha Varga : Kshira, Ghrita, Navneeta.*
- *Dravya Varga : Mamsa Rasa, Mudga Yusha, Dhanyamla.*
- *Taila Varga : Tila Taila, Sasharpa Taila, Eranda Taila.*
- *Anya Varga : Tambula, Ela, Kustha.*

Vihara

Sukhoshna Pariseka, Nirvata Sthana, Samvahana, Avagahana, Abhyanga, Brahmacharya, Ushna Pravarana, Agni Aatapa Sevana, Snigdha - Ushna Lepa.

Apathya

Those *Ahara* and *Vihara* which have adverse effects on body and are non homologatory to body are called Apathya.

Ahara

Kalaya, Chanaka, Kanguni, Kodrava, Shyamaka, Nivara, Nishpava Beeja, Rajmasha, Karira, Jambu, Trinaka, Tinduka, Shushka Mamsa, Dushita Jala.

Vihara

Vegadharana, Vyavaya, Vyayama, Vamana, Raktamokshana, Prajagarana, Diwaswapna, Adhava, Ati-Gaja-Ashwa-Ushtra-Yana Sevana.

Conclusion

The prevalence of Sciatica is on the rise and it demands multimodal approach while treating. Pain, disability, dissatisfaction with existing treatment modalities, financial burden of lead to increase use of CAM. Ayurveda is one of emerging CAM having its roots in India. The disease Sciatica resembles *Gridhrasi* of Ayurveda. A detailed explanation about *Gridhrasi* is found in Ayurveda classical texts, viz. *Nidana* (causative factors), *Samprapti* (pathogenesis), *Lakshana* (clinical features) and *Chikitsa* (conservative management, *Agnikarma*, *Siraveda* and *Panchakrama*). Ayurveda management seems to promising and a ray of hope in patients *Gridhrasi* (Sciatica). Quality research in the field may provide global acceptance of Ayurveda management in Sciatica.

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3rd Publication

Original Article

A Randomized Trial Comparing Effect of Yoga and Exercises on Quality of Life in among nursing population with Chronic Low Back Pain

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Abstract

Background: Chronic low back pain (CLBP) adversely affects quality of life (QOL) in nursing professionals. Integrated yoga has a positive impact on CLBP. Studies assessing the effects of yoga on CLBP in nursing population are lacking. **Aim:** This study was conducted to evaluate the effects of integrated yoga and physical exercises on QOL in nurses with CLBP. **Methods:** A total of 88 women nurses from a tertiary care hospital of South India were randomized into yoga group (n = 44; age – 31.45 ± 3.47 years) and physical exercise group (n = 44; age – 32.75 ± 3.71 years). Yoga group was intervened with integrated yoga therapy module practices, 1 h/day and 5 days a week for 6 weeks. Physical exercise group practiced a set of physical exercises for the same duration. All participants were assessed at baseline and after 6 weeks with the World Health Organization Quality of Life-brief (WHOQOL-BREF) questionnaire. **Results:** Data were analyzed by Paired-samples t-test and Independent-samples t-test for within- and between-group comparisons, respectively, using the Statistical Package for the Social Sciences (SPSS). Within-group analysis for QOL revealed a significant improvement in physical, psychological, and social domains (except environmental domain) in both groups. Between-group analysis showed a higher percentage of improvement in yoga as compared to exercise group except environmental domain. **Conclusions:** Integrated yoga was showed improvements in physical, psychological, and social health domains of QOL better than physical exercises among nursing professionals with CLBP. There is a need to incorporate yoga as lifestyle intervention for nursing professionals.

Keywords: *Exercises, low back pain, nurses, quality of life, yoga*

Introduction

Nursing profession is the largest chunk of health-care professionals.[1] Physical, psychological, and psychosocial challenges contribute to musculoskeletal disorders among nurses. Chronic low back pain (CLBP) is the most common musculoskeletal disorder among the nurses. It is reported that 63%–86% of nursing professionals suffer from LBP in their lifetime.[1,2] CLBP in nurses is multifactorial, and the risk factors pertain to lifestyle, physical, psychological, psychosocial, and occupational domains, namely, age, gender, physical status, smoking, workplace stress, awkward postures, poor ergonomics, carrying and repositioning of patients, prolonged standing, night shifts, working without sufficient breaks, and psychological stress are important causative/risk factors for CLBP in nurses. Nurses are required to lift and transport patients or equipment, often in difficult environment particularly in developing nations where lifting aids are not always available or practicable. These multiple factors contribute toward higher prevalence of CLBP in this population.[3] CLBP is one of the main concerns, which negatively impacts the quality of life (QOL) leading to reduced work productivity, absenteeism, and disabilities among nurses.[4] Harrington and Gill stated that LBP is the most common cause of early retirement on grounds of ill health, sickness absenteeism, job changes, and a fall in the work speed among the working population. Especially for young nurses, the mental demands of work have a critical influence on their QOL and workability.[5]

QOL measurements are being used increasingly relevant in the evaluation of disease progression, treatment, and the management of musculoskeletal disorders. QOL is recognized as a concept representing individual responses to the physical, mental, and social effects of illness on daily

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living, which influences the extent of personal satisfaction with life circumstances that can be achieved. Measuring QOL is recognized as an important add-on to objectify clinical effectiveness in recent clinical trials.[6,7] CLBP is a major deterrent for QOL, and the QOL scores correlate with pain and disability of CLBP. Furthermore, QOL correlated inversely with poor quality of sleep in nursing population. Such multifactorial problems of CLBP demand a multifaceted approach for management.[8-10]

Yoga has emerged as a popular mind-body therapy for CLBP as suggested by emerging scientific literature across the globe.[11] Yoga adopts a multifaceted approach utilizing practices at body (postures), breath (breathing techniques), and mind levels (meditation and relaxation techniques), respectively. According to national surveys, yoga practice and research have increased exponentially and in the last decade with over 10 million Americans practicing yoga for health reasons in 2002 and over 13 million in 2007.[11-13] Literature review reveals that viniyoga, hatha yoga, Iyengar yoga, and integrated yoga are the most commonly used forms to treat LBP.[14-16]

In a systematic review, Chou and Huffman concluded that there was a fair evidence reflecting efficacy of yoga therapy in subacute or CLBP.[17] In another similar review which included four randomized controlled trials (RCTs), it was observed that the intervention by Iyengar yoga and viniyoga for a period of 12–24 weeks was beneficial in CLBP.[15] Yet, another meta-analysis consisting of eight RCTs by Cramer *et al.* found strong evidence for short-term effectiveness (pain, back-specific disability, and global improvement parameters) and moderate evidences (back-specific disability) for long-term effectiveness of yoga on CLBP. Yoga was not found to be associated with serious adverse events.[18]

A study by Tekur *et al.* had observed usefulness of yoga intervention in improving QOL in patients with CLBP. However, this study was used in general population with intense residential yoga intervention. We did not come across any study that has assessed the same in nursing population with an OPD or outdoor setup intervention (1 h/day). As discussed earlier, nursing population is more prone for CLBP due to specific demands of the occupation.

Thus, the present randomized controlled study was planned to compare the effect of integrated yoga and physical exercise of similar intensity on QOL of nurses suffering from LBP.

Methods

Subjects

This study was conducted among nursing population, who were diagnosed by an orthopedician to be suffering from CLBP. Participants were working in the tertiary care teaching hospital in Kolar district of Karnataka state in India. They were randomly divided into two groups: yoga (n = 44; age – 31.45 ± 3.47 years) and physical exercise (n = 44; age – 32.75 ± 3.71 years) using random number generator (www.randomizer.org). Participants in the two groups did not differ much in relation to their age, education, or duration of illness between the groups as shown in Table 1.

Two groups' randomized controlled single-blind design was followed with participants from both the groups (yoga and exercise) receiving intervention for 6 weeks. Assessments for QOL were performed at two points of time at baseline and after 6 weeks of interventions. The statistician and the interviewer were unaware of the allocation status of the participants.

The inclusion requirements were as follows: (a) female nurses with diagnosis of either nonspecific LBP, lumbar spondylosis, or intervertebral disc prolapse, suffering from LBP for 3 months or more as diagnosed by an orthopedician and (b) knowledge of English, Hindi, and Kannada language. The exclusion criteria were as follows: (a) pain due to organic causes such as infective and inflammatory conditions, metabolic disorders, and posttraumatic condition, (b) patients with degenerative disorders of muscles, (c) patients with comorbid cardiac or neuropsychiatric illness, (d) history of major surgery or injury in the past, (e) pregnant women, and (f) patients with neurological complications of CLBP.

Written informed consent was taken from all the participants before the study and Institutional Ethical Clearance was obtained.

Study profile

From January 2015 to December 2016, nurses were screened and referred by the orthopedician. Out of 176 nurses referred for the study, 88 satisfied the study criteria.

Table 1: Sociodemographic and clinical variables comparison between yoga and exercises

Variables	Yoga	Exercises
Number of participants (only female)	44	44
Age (mean±SD)	31.45±3.47	32.75±3.71
Education		
ANM	8	3
GNM	28	32
Bachelor of nursing	8	9
CLBP		
3 months-1 year	34	37
>1 year	10	07
Causes		
Nonspecific/muscle spasm	37	35
Lumbar spondylosis	6	3
Intervertebral disc prolapse	4	3

SD=Standard deviation, ANM=Auxiliary nursing midwifery, GNM=General nursing midwifery, CLBP=Chronic low back pain

Informed consent was obtained. Baseline assessments were done, and they were randomly allocated to yoga (n = 44) and control (n = 44) groups. They underwent intervention (either integrated yoga or physical exercise) for 6 weeks; repeat assessments were performed on both groups. There were no dropouts in the study. Figure 1 provides a flow diagram of the study profile.

Materials

Assessment

The World Health Organization Quality of Life-brief (WHOQOL-BREF) questionnaire English and Kannada version was used to assess the QOL of the participants.

WHOQOL-BREF developed by the WHO is a standardized comprehensive instrument for assessment of QOL comprising 26 items. The scale provides a measure of an individual's perception of QOL on four domains: (1) physical health (seven items), (2) psychological health (six items), (3) social relationships (three items), and (4) environmental health (eight items). In addition, it also includes two questions for "overall QOL" and "general health" facets. The domain scores are scaled in a positive direction (i.e., higher scores denote higher QOL). The range of scores is 4–20 for each domain. The internal consistency of WHOQOL-BREF ranged from 0.66 to 0.87 (Cronbach's alpha coefficient). The scale has been found to have good discriminant validity. It has good test–retest reliability and is recommended for use in health surveys and to assess the efficacy of any intervention at suitable intervals according to the need of the study.[19,20]

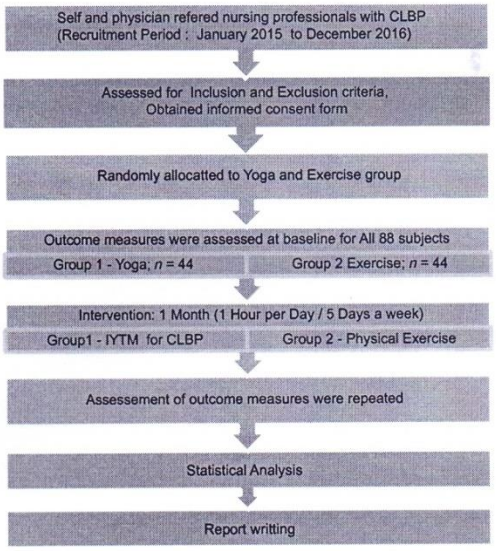

Figure 1: Trail profile

Intervention

Integrated approach of yoga therapy (IAYT) is based on the basic principle that there are five layers of the existence to human beings, namely, *Annamaya Kosa* (physical level), *Pranamaya Kosa* (subtle energy level), *Manomaya Kosa* (emotional level), *Vijnanamaya Kosa* (level of intellect), and *Anandamaya Kosa* (level of bliss). Yogic pathophysiology propounds that the disturbances at the emotional level (*adhi*) percolate to the physical level (*vyadhi*) through the layer of prana. Furthermore, all layers are interrelated and they affect each other indirectly. The IAYT is an approach which consists in not only dealing with physical layer but also includes using techniques to operate on different layers of our existence. The practices at body level (*Annamaya Kosa*) include *yogasanas,* loosening practices, at subtle energy level (*Pranamaya Kosa*) include breathing practices and pranayama, and at the mind level (*Manomaya Kosa*) are meditations and relaxation techniques.

A 1-h integrated yoga therapy module (IYTM) was designed after reviewing the literature in the field of yoga and LBP by utilizing the components of yoga at the body, subtle energy, and mind level, respectively. The designed IYTM was validated by subject experts.[21] Tekur *et al.* used as a similar intervention in an earlier study.[22] This yoga module was practiced 5 days a week for 6 weeks. The details of yoga practice are provided in Table 2.

Table 2: Intervention: Integrated yoga therapy module versus physical exercises

List of practices in IYTM for CLBP	List of physical exercises
Supta udarakarshanasana (folded leg lumbar stretch)	Standing hamstring stretch
Shava udarakarshanasana (crossed leg lumbar stretch)	Cat and camel
Pavanamuktasana (wind-releasing pose)	Pelvic tilt
Setu bandhasana breathing (bridge pose lumbar stretch)	Partial curl
Vyaghrasana (tiger breathing)	Piriformis stretch
Bhujangasana (serpent pose)	Extension exercise
Shalabhasana breathing (locust pose)	Quadriceps leg raising
Uttanapadasana (straight leg raise pose)	Trunk rotation
Ardha kati chakrasana (lateral arc pose)	Double knee to chest
Ardha chakrasana (half wheel pose)	Bridging
Quick relaxation techniques	Hook lying march
Nadi shuddhi (alternate nostril breathing)	Single knee to chest stretch
Bhramari (humming bee breath)	Lumbar rotation
Nadanusandhana (A, U, M, AUM chanting)	Press up
Deep relaxation technique	Curl ups
Laghoo shankhaprakshalana (yogic colon cleansing) (weekly once)	

IYTM=Integrated yoga therapy module, CLBP=Chronic low back pain

Control group intervention

Control group practiced physical exercise of similar intensity as IYTM for the same duration and frequency as shown in Table 2 provides the details of control intervention.

Data collection

Data were taken at the same time of the day on the 1st and 43rd day. Orientation to yoga program was given to the participants for 3 days, and then on the next day, predata collection was done after satisfactory performance. WHOQOL-BREF assessments were done on day 1 and day 43 (after 6 weeks). A trained psychologist assisted in data collection.

Data analysis

Statistical Package for the Social Sciences (SPSS) - (Version 21.0., Armonk, NY: IBM Corp.) was used for all analyses. Data of all four domains were normally distributed on Shapiro–Wilk test. Hence, the parametric tests were used. "Paired-samples *t*-test" and "Independent-samples *t*-test" were used to analyze within- and between-group data, respectively.

Results

Within-group comparisons in yoga group

Within-group pre- and postcomparison showed that, after the yoga intervention, there was a significant improvement in three domains of WHOQOL-BREF, namely, physical ($P < 0.01$), psychological ($P < 0.01$), and social ($P < 0.01$) with a trend of insignificant positive impact in environmental domain ($P = 0.07$) [Table 3].

Within-group comparisons in exercise group

Similar to yoga group, exercise group also showed a significant improvement in three domains, namely, physical ($P < 0.01$), psychological ($P < 0.01$), and social ($P < 0.01$) with no significant difference in the environmental domain ($P = 0.95$) [Table 4].

Between-group comparisons in yoga versus control group

Preintervention data

There was a no significant difference between the yoga and control groups at the baseline for all the four domains of WHOQOL-BREF: (a) physical ($P = 0.296$), (b) psychological ($P = 0.987$), (c) social ($P = 0.661$), and (d) environmental ($P = 0.904$) as shown in Table 5.

Postintervention data

There was a significant difference between the yoga and control groups after the intervention in the following domains of WHOQOL-BREF: (a) physical ($P < 0.01$), (b) psychological ($P < 0.01$), and (c) social ($P < 0.01$) with the scores of yoga group being higher than those of the control group for all the three domains, respectively. There was no significant difference between the groups for environmental domains ($P = 0.249$).

Table 3: Within yoga group (pre and post) comparison of World Health Organization Quality of Life-BREF scores

Variables	Pre/post	Yoga group		
		Mean±SD	Percentage change	*P*
Physical domain QOL	Pre	41.27±6.603	44.12	<0.001
	Post	59.48±9.041		
Psychological domain QOL	Pre	34.91±5.356	97.07	<0.001
	Post	68.80±13.428		
Social domain QOL	Pre	43.07±12.705	55.02	<0.001
	Post	66.77±12.004		
Environmental domain QOL	Pre	55.70±5.325	2.81	0.078
	Post	57.27±6.028		

QOL=Quality of life, SD=Standard deviation

Table 4: Within exercise group (pre and post) comparison of World Health Organization Quality of Life-BREF scores

Variables	Pre/post	Exercise group		
		Mean±SD	Percentage change	*P*
Physical domain QOL	Pre	39.82±6.377	25.33	<0.005
	Post	49.91±8.575		
Psychological domain QOL	Pre	34.93±7.315	20.89	<0.001
	Post	42.23±7.358		
Social domain QOL	Pre	44.09±8.757	14.49	<0.001
	Post	50.48±8.609		
Environmental domain QOL	Pre	55.84±5.278	0.089	0.957
	Post	55.89±5.136		

QOL=Quality of life, SD=Standard deviation

Table 5: Between group (yoga vs. exercise) comparison of World Health Organization Quality of Life-BREF scores

Variables	Pre/post	Group	Mean±SD	*P*
Physical domain QOL	Pre	Yoga	41.27±6.60	0.296
	Pre	Exercise	39.82±6.34	
	Post	Yoga	59.48±9.04	<0.005
	Post	Exercise	49.91±8.57	
Psychological domain QOL	Pre	Yoga	34.91±5.36	0.987
	Pre	Exercise	34.93±7.31	
	Post	Yoga	68.80±13.43	<0.001
	Post	Exercise	42.23±7.36	
Social domain QOL	Pre	Yoga	43.07±12.70	0.661
	Pre	Exercise	44.09±8.76	
	Post	Yoga	66.77±12.00	<0.001
	Post	Exercise	50.48±8.61	
Environmental domain QOL	Pre	Yoga	55.70±5.33	0.904
	Pre	Exercise	55.84±5.28	
	Post	Yoga	57.27±6.03	0.249
	Post	Exercise	55.89±5.14	

Discussion

At the end of 6 weeks of intervention as mentioned before, we observed that both the groups showed significant improvements in physical, psychological, and social domains of WHOQOL-BREF, whereas the environmental domain did not show significant improvements in either of the groups. As compared to the control group, patients who performed yoga reported significantly higher scores on the psychological domain (yoga – 97.7% and control – 20.89%). It was further observed that percentage improvement in physical and social domains was higher in the yoga group as compared to the exercise group (physical domain: yoga – 44.12% vs. control – 25.33%; and social domain: yoga – 55.02% vs. control – 14.49%).

Previously, Tekur *et al.*[22] demonstrated the usefulness of a 7 day intensive residential integrated yoga in improving QOL in 80 patients with CLBP in a highly controlled setting where patients were away from their occupational and other duties. They observed a significant improvement in all the four domains of WHOQOL-BREF in the yoga-based lifestyle module as compared to physical exercise-based lifestyle change module. One of the limitations with such trials is that they are not practical for working young nursing population and difficult to replicate such studies. In our study, we used 1-h yoga program which included all major components of yoga therapy, namely, *asanas, pranayama,* and relaxation. The exercise group also followed similar duration and frequency of intervention. We also observed improvement in physical, psychological, and social domains in both the groups but not in the environmental domain. The percentage improvements were higher in yoga group than the exercise group for physical, psychological, and social domains, respectively. This may be because the intervention offered by Tekur *et al.* was much more intensive than ours and the residential setup involved exposure to such an environment which was significantly different from the workplace. We performed this research in much more pragmatic setup and observed similar outcomes.

Underplaying mechanism of integrated yoga therapy module

The probable mechanism of action of yoga may be through improvement of autonomic functions through triggering neurohormonal mechanisms that suppress sympathetic activity through downregulation of the hypothalamic–pituitary–adrenal axis.[23] Mindfulness-based practices may also enhance cognitive flexibility, which may further reduce stress, anxiety, and pain, thereby improving QOL.[24] Furthermore, the cellular effects of mechanical and fluid pressure on structures such as cartilage suggest that yoga postures might alter joint function. Low levels of intermittent fluid pressure, as occur during joint distraction, have been shown *in vitro* to decrease production of catabolic cytokines, such as interleukin-1 and tumor necrosis factor.[25] Yoga may be one way to provide the motion and forces on joints needed to preserve integrity. In addition, pranayama, meditations, and relaxation techniques following *yogasanas* help to relax joints and muscles, reduce oxidative stress, and calm the mind.[26] This study implicates a probable role of integrated yoga therapy in the management of patients suffering from CLBP.

In a cross-sectional study on 501 nurses from different hospitals of Turkey, it was observed that there was a positive correlation between QOL as assessed by WHOQOL-BREF and job satisfaction (assessed using Short-Form Minnesota Questionnaire).[27] Similarly, another cross-sectional study on 435 female nurses from five regional centers in Taiwan revealed that associations between scores on the sleep-quality and QOL scales were statistically significantly inversely correlated.[28] Another survey on 1534 nursing professionals from eight different hospitals in Taiwan found that improved QOL of nurses translated into better workability (which may indirectly contribute to better health-care service delivery to the patients).[29] In the above study, it was also observed that mental demands of work were a critical influence on QOL and workability, especially in young nursing professionals. The authors further recommended countermeasures such as enhancing the ability to cope with the job's mental demands for improving and maintaining the workability of nurses.

Yoga may be considered one such intervention which has been found useful in enhancing the ability to cope with mental demands and thereby improve QOL and workability of nurses. An anonymous E-mail survey was conducted between April and June 2010 of North American nurses interested in mind-body training to reduce stress.[30] Of the 342 respondents, 96% were women and 92% were Caucasian. Most (73%) reported one or more health conditions, notably anxiety (49%), back pain (41%), gastrointestinal problems such as irritable bowel syndrome (34%), or depression (33%). Their median occupational stress level was 4 (0 = none and 5 = extreme stress). Nearly all (99%) reported already using one or more mind-body practices to reduce stress. The most common mind-body practices used by the nurses were as follows: intercessory prayer (86%), breath-focused meditation (49%), healing or therapeutic touch (39%), yoga/tai chi/qi gong (34%), or mindfulness-based meditation (18%). The greatest expected benefits were for greater spiritual well-being (56%); serenity, calm, or inner peace (54%); better mood (51%); more compassion (50%); or better sleep (42%).[30]

Physical domain of WHOQOL-BREF features such as mobility, fatigue, pain, sleep, and work capacity. The higher percentage of improvement in the yoga group compared to exercises therapy group can be credited to better reduction in pain and disability with improvement in spinal flexibility.[31]

Psychological domain features such as feelings, self-esteem, spirituality, thinking, learning, and memory. The higher

percentage of improvement in the yoga group compared to exercises therapy group may be credited to better reduction in stress, anxiety, and depression.[31,32]

Social domain of WHOQOL-BREF features questions relating to problems in interpersonal relationships and social support. Yoga also acts like cognitive behavioral therapy; this may be the reason for the superior impact of yoga intervention compared to physical exercises in nurses with CLBP.

Environmental domain deals with problems relating to financial resources, physical safety, and physical environment such as pollution, noise, and climate. As working environment remained same throughout, this might have been the reason, we did not able to notice any significant changes in the environmental domain in both the groups.

Thus, yoga appears to be an integrated therapeutic tool and feasible intervention for improving QOL in nursing professionals compared to physical exercise as it offers holistic approach.

The strengths of the study are as follows: (a) this multidisciplinary study encompasses the fields of yogic science, orthopedics, and psychology; (b) a large sample of 88 CLBP patients were enrolled for the study with no dropouts, (c) no earlier study has reported effect of integrated yoga intervention on QOL of nurses suffering from CLBP; (d) because the study involved a pragmatic approach, the acceptability and adherence to therapy were good; and (e) as yoga and control program was delivered through a standard protocol, it could be reproduced in the exact way for future interventions.

This study has a few limitations, namely: this study was a preliminary attempt to assess the response of nursing population suffering from CLBP, and future studies should incorporate more objective variables such as electromyography, radio-imaging, biochemical measures, and other advanced objective variables of autonomic functions.

Conclusions

IYTM improves physical, psychological, and social health domains of QOL among nursing professionals with CLBP more than the physical exercises. There is a need to incorporate yoga as lifestyle intervention for nursing professionals with CLBP.

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Conflicts of interest

There are no conflicts of interest.

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12.9 List of research articles presented for journal club

Sl. No.	Date	Title of paper
1	08.07.2016	Effect of yogic colon cleansing (Laghu Sankhaprakshalana Kriya) on pain, spinal flexibility, disability and state anxiety in chronic low back pain
2	09.07.2016	Designing, validation, and feasibility of integrated yoga therapy module for chronic low back pain
3	15.07.2016	Effect of Short Term Intensive Yoga Program on Pain, Functional Disability and Spinal Flexibility in Chronic Low Back Pain- A randomized control study
4	16.07.2016	Yoga versus education for Veterans with chronic low back pain: study protocol for a randomized controlled trial
5	12.08.2016	Mind-Body Exercises for Nurses with Chronic Low Back Pain: An Evidence-Based Review
6	20.08.2016	Effects of hatha yoga exercises on spine flexibility in women over 50 years old
7	17.09.2016	Prevalence of low back pain and associated occupational factors among Chinese coal miners
8	23.09.2016	Effect of yoga on quality of life of CLBP patients: A randomized control study
9	24.09.2016	A comprehensive yoga programs improves pain, anxiety and depression in chronic low back pain patients more than exercise: An RCT