Effect of Integrative Naturopathy and Yoga in a Patient with Rheumatoid Arthritis Associated with Type 2 Diabetes and Hypertension

Abstract
A 54-year old married woman was diagnosed with rheumatoid arthritis in 2002, essential hypertension in 2008, type-2 diabetes in 2011 and gangrene over 2nd toe of right foot. She underwent conventional management in private hospitals. Her symptoms, began with moderate to severe pain associated with swelling, stiffness (more in the morning) in multiple joints especially over small joints. In July-2014 she visited our college hospital with the complaints of pain, mild swelling and stiffness over multiple joints associated with poor quality of sleep (QOS) and quality of life (QOL). Subject received integrative Naturopathy and Yoga therapies (INYT) with conventional medicine daily for 10-days. After 10-days, improvements in pain, blood sugar, depression, anxiety, stress, QOS, QOL, blood analysis with normal blood pressure (BP) was observed. This suggests that INYT could be considered as an adjuvant to conventional medicine in RA associated with type-2 diabetes and essential hypertension.

Keywords: Essential hypertension, integrative naturopathy and yoga therapies, rheumatoid arthritis, type 2 diabetes

Introduction
Rheumatoid arthritis (RA) is a chronic, systemic, polyarticular,[1] inflammatory, autoimmune disorder resulting in degeneration of the synovial lining in joints, making them swollen, stiff, and less functional.[2] It affects women three times more than men.[1] There have been many previous studies reported about Naturopathy and Yoga therapies in RA, diabetes and hypertension separately. Lack of evidence in using integrative Naturopathy and Yoga Therapies (INYT) especially in patient with RA associated with type-2 diabetes and hypertension made us conduct the present case study.

Case Report
A 54-year married woman diagnosed with RA in 2002 and underwent conventional management in a private hospital. Her symptoms, as described by her, began with moderate to severe pain associated with swelling, stiffness (more in morning) in multiple joints especially over bilateral small joints, elbow, shoulder, knee and hip joints. Physician advised her to take Methotrexate and Hydrochloroguine. In 2008, 2011, and January-2014 she was diagnosed as having hypertension, type-2 diabetes and gangrene in the second toe of the right foot. Following this, she underwent conventional management. In July-2014 she visited our college hospital and was on Methotrexate, Hydrochloroguine, Prednisolone, Diclofenac sodium, Folic acid, Rabeprazole sodium, Amlodipine, Glimepiride, Telmisartan, combination of Calcium carbonate; Vitamin D-3; and Elemental Zinc (CaltenD), Clopidogel, Vitamin B complex and multi-minerals (Cobadex CZS), Rosuvastatin. Written informed consent was obtained from subject.

Intervention
The treatments such as Naturopathy (60 – 90 min.), Yoga (60 min.), and acupuncture (30 min.)[3,4] were given daily for 10-days along with the patient’s prescription medicines (except Diclofenac sodium). A detail of intervention is given in Table 1. Data assessments were done before and after intervention [Table 2].

Outcome measures
Visual analog scale for pain
It was used to evaluate subject’s pain intensity on a scale of 0-10, where 0

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Table 1: A detail of intervention given to the subject for the period of 10 days

| Therapy        | Specific treatment                                                                 | Duration/session (min) | Total number of sessions/10 days |
|----------------|-------------------------------------------------------------------------------------|-------------------------|----------------------------------|
| Hydrotherapy   | Alternate hot and cold douche to whole body                                         | 15                      | 3                                |
|                | Deluxe hydro massage (full body massage done using water with pressure when subjects are immersed in a bath tub) | 15                      | 1                                |
|                | Enema                                                                               | 10                      | 1                                |
|                | Gastro hepatic pack                                                                  | 30                      | 2                                |
|                | Neutral half bath with magnesium sulfate                                            | 30                      | 1                                |
|                | Neutral spinal bath                                                                  | 30                      | 1                                |
|                | Neutral under water massage                                                         | 15                      | 3                                |
|                | Sauna bath                                                                          | 10-15                   | 2                                |
|                | Steam bath                                                                          | 10-15                   | 4                                |
| Mud therapy    | Mud packs to abdomen and eyes (twice/day except Sunday [once/day])                  | 20                      | 19                               |
| Massage therapy| Full body massage                                                                   | 45                      | 1                                |
|                | Salt (magnesium sulfate) glow oil massage                                            | 60                      | 1                                |
|                | Partial massage to bilateral hands and legs                                         | 30                      | 1                                |
| Yoga therapy   | Type of practice (once/day except Sunday)                                            | 30                      | 9                                |
|                | Specific postures (asanas) such as sūkṣma vyāyāma (loosening practices), Śāvāsana, Tāḍāsana, Tīrīyak Tāḍāsana, Kaṭi Cakrāsana, Trikonāsana (triangle pose), and Ardha-padmāsana (half lotus pose) | 30                      | 9                                |
|                | Controlled breathing (pranayama) such as Nādiśodhana prāṇāyāma, Bhrāmarī, Śītakārī, left nostril breathing, and chanting OM | 20                      | 9                                |
|                | Relaxation techniques                                                                | 10                      | 9                                |
| Acupuncture    | Needling points                                                                       |                         |                                  |
|                | GV-20*, LI-4*, LI-11*, BL-11*, GB-34*, SP-6*, ST-44*, EX-28*, EX-36*               | 30                      | 10                               |

| Therapy | Food items with quantity | Timings | Serving/day |
|---------|--------------------------|---------|-------------|
| Diet therapy | Bitter gourd juice (250 ml) | 7.30 am | 1           |
|         | Rāgi gruel (250 ml)       | 9.00 am | 1           |
|         | Rice (200 g) and boiled vegetables such as bottle gourd, ridge gourd, ash gourd, potato, tomato, carrot, beetroot, Knol-kol, cabbage, capsicum, beans, ladies finger (200 g) | 11.00 am | 1           |
|         | Papaya (100 g), buttermilk with one table spoon of fenugreek powder (250 ml) | 11.00 am | 1           |
|         | Knol-kol juice (250 ml)   | 2.00 pm | 1           |
|         | Cucumber (100 g)          | 4.00 pm | 1           |
|         | Rice (200 g) and boiled vegetables (200 g)                                          | 6.00 pm | 1           |
|         | Papaya (100 g), buttermilk with one table spoon of fenugreek powder (250 ml) | 6.00 pm | 1           |

*Single needling, *Bilateral needling, *Bilateral needling (of 4 points, 3 points were used in each hand and foot except the points between first and second finger and second and third toes. GV: Governing vessel, LI: Large intestine, BL: Urinary bladder; GB: Gall bladder, SP: Spleen, ST: Stomach, EX: Extra-ordinary points

indicates no pain and 10 indicates highest pain. Subject was suggested to mark on the scale to indicate her pain intensity.[3]

*The Pittsburgh Sleep Quality Index*

It is a questionnaire about sleep which consists of seven components in nine items. This was used to evaluate subject’s quality of sleep before and after the intervention. A total score of 0-4 indicates good sleep quality, 5-10 indicates poor sleep quality, and >10 indicates sleep disorder.[3,5]

*Depression Anxiety and Stress Scale*

It is a 42-item questionnaire which includes threesself-report scales designed to measure state of depression, anxiety and stress. Each scale contains 14 items where subject was asked to use four point severity/frequency scales to rate the extent to which she had experienced each state over the past week.[6]

*Short Form 36 Version 2 health survey*

It consists of a 36 item questionnaire which measures the health in 8-dimensions. For each dimension item scores were noted, averaged and transformed into a scale of 0-100 where 0 indicate worst possible health and 100 indicate best possible health.[7]

*Blood and bio-chemical analysis*

Blood and bio-chemical analyses were done to assess hemoglobin, erythrocyte sedimentation rate (ESR), white
Table 2: Baseline and post-test assessments of the subject

| Variables                              | Baseline | Post-test |
|----------------------------------------|----------|-----------|
| Height (cm)                            | 152      | -         |
| Weight (kg)                            | 51.5     | 51.3      |
| BMI (kg/m²)                            | 22.29    | 22.20     |
| FBS (mg/dl)                            | 127      | 92        |
| PPBS (mg/dl)                           | 160      | 127       |
| SBP (mmHg)                             | 122      | 118       |
| DBP (mmHg)                             | 80       | 82        |
| Visual analog scale score for pain     | 4.2      | 1.7       |
| PQSI                                   | 6        | 4         |
| DASS                                    |          |           |
| Depression                             | 12       | 5         |
| Anxiety                                | 19       | 6         |
| Stress                                 | 26       | 11        |
| SF-36v2 health survey                  |          |           |
| Total score                            | 46.25    | 57.22     |
| Physical functioning                   | 25       | 35        |
| Role limitations due to physical health| 37.5     | 62.5      |
| Role limitations due to emotional problems | 66.67   | 66.67     |
| Energy/fatigue                         | 56.25    | 68.75     |
| Emotional well being                   | 75       | 75        |
| Social functioning                     | 37.5     | 62.5      |
| Pain                                   | 32.5     | 55        |
| General health                         | 50       | 60        |
| Blood analysis                         |          |           |
| Hemoglobin (g%)                        | 10.6     | 10.8      |
| ESR 1st h (mm/h)                       | 50       | 41        |
| White blood cells                      |          |           |
| Total count (cells/mm³)                | 6300     | 6500      |
| Neutrophils (%)                        | 48       | 55        |
| Eosinophils (%)                        | 4        | 2         |
| Basophils (%)                          | 0        | 0         |
| Lymphocytes (%)                        | 47       | 42        |
| Monocytes (%)                          | 1        | 1         |

PQSI: Pittsburgh sleep quality index, DASS: Depression Anxiety and Stress Scale, SF-36v2: Short Form 36 Version 2, ESR: Erythrocyte sedimentation rate, BMI: Body mass index, FBS: Fasting blood sugar, SBP: Systolic blood pressure, PPBS: Postprandial blood sugar, DBP: Diastolic blood pressure.

Blood cell (WBC) (total and differential counts); and to assess fasting blood sugar (FBS) and postprandial blood sugar (PPBS) levels respectively. Bio-chemical analysis was done by using CKK-24 Versatile Bio-chemistry Analyser, Bangalore, India.

Blood pressure

Systolic blood pressure (SBP) and diastolic blood pressure (DBP) was assessed before and after the treatment period in sitting position using a standard mercury sphygmomanometer.

Results and Discussion

Result of this study showed improvements in VAS pain score, FBS, PPBS, hemoglobin, ESR and WBC counts; PSQI, DASS, SF-36v2 health survey scores with maintenance of SBP and DBP compared to baseline [Table 2]. These results may be attributable to the INYT intervention along with conventional medicine. Acupuncture,[5,8] massage,[3] mud,[9] hydrotherapy,[10] and yoga[11] were shown to have positive role in reducing pain even after stopping the medication for pain (i.e., Diclofenac sodium). Hence, this result suggests that the INYT was not only useful to reduce pain but also useful in reducing the medication for pain and its adverse effects. Possible mechanisms of pain reduction in acupuncture might be through modulation of nor-adrenaline and serotonin signalling system; production of endogenous opioids, somatostatin and other neurotrophins that together enhance descending inhibition of nociception on spinal afferents.[9] Massage might reduce pain by promoting muscle relaxation.[1] Temperature and pressure of water in hydrotherapy can block nociceptors by acting on thermal receptors and mechanoreceptors and exert positive effect on spinal segmental mechanisms, which is useful for painful condition.[10] Mud might reduce inflammation and sulfur minerals absorbed by skin might cause an analgesic effect.[9]

RA patient may have excessive tumor necrosis factor-alpha (TNF-α) which causes destruction of articular cartilage, bone resorption, and inhibition of bone formation.[1] Our study showed reduction in ESR and previous studies on acupuncture[8] and mud therapy[9] reported its anti-inflammatory effects. This might be attributed to reduced inflammatory reaction and cartilage damage; and improvement in cartilaginous hemostasis by reducing inflammatory cytokines such as TNF-α[8,9] interleukin-1β[3] and by increasing chondroprotective insulin-like growth factor-1.[9]

Anti-TNF therapy is shown to restore patient’s immune cells and hemoglobin, and reducing rheumatoid factor levels, cytokine production etc.[1] Similarly, our study shows improvement in immune cells and hemoglobin. Previous studies on yoga[11,12] hydrotherapy,[10] acupuncture[8] and mud therapies[9] reported to reduce rheumatoid factor in RA,[11,12] and rejuvenate immune organs;[11] improve immunity,[10] and reduce cytokine productions such as interleukin-1β[8] and TNF-α[8,9] respectively. Stress is associated with triggering autoimmune disease and worsening of RA symptoms but yoga was reported to reduce stress and have effect on musculoskeletal system. This suggests that yoga should be considered as an add-on therapy for RA. This is also supported by the results of our study.[2]

Yoga is effective in hypertension, diabetes,[1] stress,[2] and RA.[2,11] Yoga was reported to improve pancreatic beta-cells; insulin sensitivity; glucose uptake by muscles[11] and reduce blood glucose.[11] Massage was reported to promote parasympathetic activation[3] which reduces
heart rate, BP,[3] stress; decrease cortisol and increase serotonin, dopamine and endorphins which are useful for pain reduction and for improving QOS.[3] Acupuncture can increase the content of γ-amino butyric acid and may enhance QOS.[3] Mud-pack therapy enhances skin blood circulation.[9] and sauna therapy improves endothelial function. It also increases endothelial nitric-oxide synthase activity; and improves peripheral blood flow in ischemic limbs[10] which might have proven useful for our subject since she was diagnosed with gangrene in the second toe of her right foot.

Improvement in pain, blood sugar, blood analysis, depression, anxiety, stress and maintenance of normal BP might also have contributed to improvement in QOS and QOL in our subject. Limitations of our study include lack of assessment of major inflammatory bio-markers. The validity and reliability of the results of this case study may vary because it is a single case. The subject was not followed-up to see whether or not these effects were sustained. Hence, further studies are required with larger sample size and more advanced techniques to validate our results.

Conclusion
Result of our study suggests, INYT may be considered as an adjuvant to conventional medicine in patient with RA associated with type-2 diabetes and essential hypertension.

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Conflicts of interest
There are no conflicts of interest.

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