

EFFECT OF YOGIC PACKAGE ON RHEUMATOID ARTHRITIS

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(Received on October 27, 2010)

Abstract : This study aimed at studying the effect of yogic package (YP) with some selected *pranayama*, cleansing practices and meditation on pain intensity, inflammation, stiffness, pulse rate (PR), blood pressure (BP), lymphocyte count (LC), C-reactive protein (CRP) and serum uric acid (UA) level among subjects of rheumatoid arthritis (RA). Randomized control group design was employed to generate pre and post data on participants and controls. Repeated Measure ANOVAs with Bonferroni adjustment were applied to check significant overall difference among pre and post means of participants and controls by using PASW (SPSS Inc. 18th Version). Observed result favored statistically significant positive effect of YP on selected RA parameters and symptoms under study at $P < 0.05$, 0.01 and 0.001 respectively that showed remarkable improvement in RA severity after 40-day practice of YP. It concluded that YP is a significant means to reduce intensity of RA.

Key words : yogic package (YP) rheumatoid arthritis (RA)

INTRODUCTION

In present scenario, rheumatoid arthritis (RA) is a disease with no cure, which affects people of working age- the prevalence increases with age and may reach 5% above the age of 55 by affecting 80-90% hands and wrist joints of RA patients (1). Patients complain of various symptoms including joint pain and stiffness, loss of range of movement and reduction in muscle power and grip

strength (2, 3) that leads to increased difficulties in performing daily activities.

Yogic management of the arthritic process is all embracing and effectively complements standard medical measure (4). In previous study it was found that yoga practice leads to significant improvement in grip strength (5, 6), reduction in disability scores of the Health Assessment Questionnaire and rheumatoid factor levels without having

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any adverse effects but the improvement varies with factors like age and gender (7). Similarly another study reported that yoga group was able to return to their normal active life style much earlier than controls. They reported more functional efficiency as compared to controls about their daily domestic chores and they were more independent in offending to their daily activities and depended less on their security of distress symptoms such as pain, stiffness, swelling and immobility etc.. which reflected their overall improvement in functional quality of life in yoga group (8).

However, there were no such studies which assessed the effect of yoga comprehensively on various parameters regarding RA. Hence, the present study was conducted to investigate the effect of Yogic Package (YP) on pain intensity, number of inflamed joints, time duration of early morning stiffness on joint movement, pulse rate (PR), systolic blood pressure (SBP), diastolic blood pressure (DBP), lymphocyte count (LC), C-reactive protein (CRP) and serum uric acid (UA) level of RA patients.

MATERIALS AND METHODS

Research design

Out of 160 available RA patients, 80 were selected randomly and 40 each were allotted to experimental- and control group via random assignment. Baseline measurements on selected outcome variables were taken from both experimental and control groups and then participants had undergone through prescribed yoga program for one and half month. Controls were informed to be

provided same yoga program after one and half month practice with participants. Post measurements on same outcome variables regarding RA were taken from both groups after one and half month. Post measurements were not taken immediately after yoga session to avoid the possible immediate change in BP, PR etc. as the consequence of yoga practice. The prime concern of the study was to observe the long term effect of intervened yoga programs on RA related outcome variables under study. Thus, the design employed was randomized control group design with one yoga group and a non-yoga group having equal size.

Participants

Eighty subjects (56 females and 24 males) with age range 23-48 years were randomly selected out of 160, from BHEL Hospital (40 subjects) and Gurukul Medical College (40 subjects), Haridwar who were admitted in March 2005 to November 2005. RA patients having aforementioned age range, interested and capable to practice prescribed yoga program were included under the study. The subjects out of this age range, uninterested for the yoga practice and having more medical complexes were excluded. The baseline group means \pm SD regarding age, duration of illness and other selected parameters for both participants and controls is shown in table 2. Participants and controls were suggested to take their usual medication and sign the consent form. The study was approved by Institutional Ethics Committee. There was no drop out of the participants and controls during intervention. Nonetheless, 5 participants were not regular in yoga session due to their distant accommodation.

Measures

The tools and tests used to take baseline and post measures related to selected parameters regarding RA were: Simple Descriptive Pain Intensity Scale (SDPIS) prepared by Bram Riegel (22) to measure the pain intensity ranging from no pain (0) to worst possible pain (5); direct visual observation and information given by the patients during clinical assessment to rate early morning stiffness (in min) and number of inflamed joints; palpitation of radial artery to rate PR (Pulse/min); Mercurial Sphygmomanometer (manufactured by Gupta Son's India, Dayal Bagh, Ambala Cant) to rate BP (mmHg); monocular and binocular microscope to rate LC (%) and CRP (mg/L) and RA 50 analyzer from Bayer Diagnostics, Baroda, Gujarat, India to rate UA (mg/dl).

Intervention

This integrated approach was developed on the basis of ancient yoga texts to bring about the improvement/alleviation on pain intensity, inflammation, and stiffness, PR, BP, LC, CRP and UA among RA subjects. The YP was composed of physically effective practices (cleansing practices, *ananas*, and healthy yoga diet), *pranayamas*, and meditation. Yoga was taught by qualified yoga teacher. The practice of YP was one and a half hour per day for 7 weeks (i.e. 40 days approximately) excluding Sunday. During practice of *Kunjla*, participants felt discomfort for the first two weeks. Expertise of the instructor motivated them to practice first and later they went comfortably. On the other hand, all the participants comfortably practiced *Jal Neti* since very beginning.

Data analysis

Statistical analyses were performed by using Predictive Analytic Software (version 18.0. SPSS Inc). Mixed ANOVAs were used to analyze the difference among the pre and post means of participants and controls. Before and after scores were treated as a within factor and yoga and non-yoga group as between subject factor.

RESULTS

The baseline and post group means and standard deviations for the data regarding (i) pain intensity, (ii) number of inflamed joints, (iii) morning stiffness, (iv) PR, (v) SBP, (vi) DBP, (vii) LC, (viii) CRP, and (ix) UA are shown in Table III.

TABLE I: Detail schedule of the Intervention.

<i>Total duration of intervention = 40 days</i>	
<i>Timing = 1.30 hr s. (6:00 to 7:30 am)</i>	
Instant relaxation with Gayatri Mantra	- 5 mins
Kunjla	- twice/week and
Jal Neti	- thrice week (9)
Asanas :	
Anti -Rheumatic series (Pawanmuktasana - I/joint loosening series) for 1st week, Marjari Asana (Cat pose), Vakranasana (Seated spinal twisting), Shashankasana (Rabbit pose), Bhujangasana (Serpent pose), Shalabhasana (Locust pose),	
Halasana (Plough pose)	- 40 min
followed by Shavasana (Corpse pose)	- 10 min (9)
Pranayamas :	
Sequentially Nadisodhan Pranayama (NSP)	- 10 min - 3 rounds
Bhastriki Pranayama (BTP)	- 05 min - 2 rounds
Bhramri Pranayama (BRP)	- 05 min (10 rounds) (9, 10)
Meditation : Soham	- (8 min) (11)
followed by Om chanting	- (10 rounds - 2 min)
Quarries and feedbacks :	- 5 min

The repeated-measure ANOVAs results showed that there was statistically significant difference between two states (before and after) in (i) pain intensity, (ii) number of inflamed joints, (iii) morning stiffness, (iv) PR, (v) DBF, (vi) LC, (vii) CRP, and (viii) UA at $P < 0.001$ level except SBP, i.e. at $P < 0.006$ level.

Post hoc analyses for multiple comparisons were performed with Bonferroni adjustment. There was statistically significant difference between post-experimental and post-control in (i) pain intensity, (ii) number of inflamed joints, (iii) morning stiffness, (iv) PR, (v) SBP, (vi) DBP, (vii) LC, and (viii) UA (i.e., $P < 0.001$, $P < 0.01$, $P < 0.001$, and $P < 0.05$ respectively) excluding CRP level (insignificant). In contrast, there was statistically insignificant difference between pre-experimental and pre-control among all the aforementioned parameters excluding CRP level at $P < 0.05$ level.

After YP intervention, there was significant reduction (towards normalcy) in

TABLE II: Baseline mean \pm SD regarding age, duration of illness and other selected parameters.

Parameters	Experimental group (M \pm SD)	Control group (M \pm SD)
Age (year)	35.075 \pm 7.334	34.65 \pm 7.3
Duration of illness (months)	11.525 \pm 7.03	12.15 \pm 7.02
Pulse rate (per/min)	81.05 \pm 6.91	79.65 \pm 6.53
Systolic BP (mmHg)	131.85 \pm 14.92	130.50 \pm 13.37
Diastolic BP (mmHg)	82.15 \pm 8.87	85.93 \pm 9.02
Lymphocyte count (%)	28.33 \pm 4.82	29.25 \pm 5.67
CRP (mg/L)	7.09 \pm 0.95	6.59 \pm 1.17
Serum uric acid (mg/dl)	5.12 \pm 1.18	4.90 \pm 1.13

(i) pain intensity, (ii) number of inflamed joints, (iii) morning stiffness, (iv) PR, (v) SBP, (vi) DBP, (vii) LC, (viii) CRP, and (ix) UA (i.e., $P < 0.001$, $P < 0.001$, $P < 0.001$, $P < 0.001$, $P < 0.01$, and $P < 0.01$ respectively) among the participants. On contrary, there was no significant reduction in aforesaid parameters among the controls excluding significant reduction in number of inflamed joints and morning stiffness at $P < 0.05$ and 0.01 respectively. Although, statistically insignificant slight increases were reported in post- LC and UA

TABLE III: Baseline and post measurements on experimental and control groups related to selected parameters regarding RA. Values are group mean \pm SD.

Parameters	Control		Experimental	
	Before	After	Before	After
Pain intensity	2.03 \pm 0.7	1.92 \pm 0.76	1.90 \pm 0.84	0.20 \pm 0.516***.†††
Inflamed joints	3.25 \pm 1.24	2.38 \pm 1.55*	3.38 \pm 1.31	0.43 \pm 0.64***.†††
Morning Stiffness	81.68 \pm 21.65	55.88 \pm 22.90**	76.25 \pm 20.56	13.15 \pm 17.18***.†††
Pulse rate (per/min)	79.65 \pm 6.53	79.58 \pm 6.30	81.05 \pm 6.91	74.83 \pm 2.89***.†††
Systolic BP (mmHg)	130.50 \pm 13.37	129.60 \pm 12.6	131.85 \pm 14.92	124.70 \pm 7.42**.*†††
Diastolic BP (mmHg)	85.93 \pm 9.02	85.43 \pm 7.97	82.15 \pm 8.87	80.60 \pm 5.65**.*††
Lymphocyte count (%)	29.25 \pm 5.67	29.60 \pm 4.64	28.33 \pm 4.82	25.80 \pm 1.95**.*†††
CRP Level (mg/L)	6.59 \pm 1.17	6.47 \pm 1.04	7.09 \pm 0.95#	6.43 \pm 1.65**
Serum uric acid (mg/dl)	4.90 \pm 1.13	4.98 \pm 1.05	5.12 \pm 1.18	4.50 \pm 0.91**.*†

Analyses of data were done by repeated-measure ANOVA, post hoc with Bonferroni adjustment. The * depicts before compared with respective after state (within group), # depicts between groups before comparison and † depicts between groups after comparison. * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$, # $P < 0.05$, † $P < 0.05$, †† $P < 0.01$, ††† $P < 0.001$.

among the controls that indicated the aggravation of RA symptoms among controls after 40 days.

DISCUSSION

Yogic practices are known to significantly improve health status. The exact pathway of YP effect to reduce the pain severity is yet in doubt and hence is a matter of prime importance in further researches. Melzack and Wall have produced a hypothesis called "Gate control theory" (12) which says that A fibers mediated by substantia gelatinosa increases the inhibitory effect on dorsal horn cells firing rate of the spinal cord, while C fibers decrease its inhibitory effect. The significant reduction in pain intensity after the practice of YP among participants in the present study might be due to progressive stimulation of A fibers in the nerve bundles and their ending in substantia gelatinosa leading to inhibition of dorsal horn cells firing of spinal cord and subsequently the onset of pain sensation. Moreover, detaching the mind from body/object consciousness also help in the total insulation of pain sensation (13). Meditation is associated with sharp increase in blood plasma melatonin (14) and glutamate that stimulates the arcuate nucleus of the hypothalamus and causes the release of β -endorphin (BE). This probably may be responsible for effects such as decreased pain, joyous and euphoric sensation during meditation along with other chemical mediator (15).

Practice of YP generates better static stretching of muscles and tendons of related joints that can tune up the stretch reflex mechanism and impart proper training to the muscle spindle, nerve, and nerve ending (16).

This might have helped to improve flexibility and tone of the muscles and joints, consequently leading to significant improvement in the early morning stiffness among participants in greater magnitude than the controls as supported by several previous studies. That reported yogic efficacy to improve muscular flexibility and fitness by toning muscles and reducing muscle tension (17, 18).

Yogic practices like *asanas*, *pranayamas* and meditation have shown statistically significant reduction in SBP, DPB and PR (19-23). The significant reduction in SBP, DBP and PR in the present study is in accordance with aforementioned studies. DBP depends upon peripheral resistance and lung inflation has been known to decrease systemic vascular resistance (24). *Pranayama* increases frequency and duration of inhibitory neural impulses by activating pulmonary stretch receptors during above tidal volume inhalation as in Hering Bruer reflex, which bring about withdrawal of sympathetic tone in the skeletal muscle blood vessels, leading to widespread vasodilatation, thus causing decrease in peripheral resistance and DBP (22). Reduction in SBP and PR may be related to combined effects such as changes in cardiac output, peripheral vascular resistance, and humoral factors (25).

Muscles stretching in yogic practices develop tremendous pressure inside the working muscle cells and as a result, the waste products are thrown out of the respective cells (16). Further, cleansing process like *Neti*, *Dhauti* help the patients to bring out toxic matters and other secretions from nasal passages, air sinuses

and gastrointestinal tract. This helps to reduce the volume of infected material and intensity of infection. This could have led to the decrease in participants' LC towards lower limit of normal range.

The present study also shows significant reduction in post CRP level and inflammation. These findings were supported by the previous studies that have reported decreases in markers of inflammation such as high sensitivity CRP as well as inflammatory cytokines such as interleukin-6 (26) and lymphocyte NF- κ B (27). Finally, the significant reduction in the serum UA in the present study was in accordance with previous research findings that reported practice of *asana*, *pranayama*, and *kriyas* caused

significant reduction in blood urea (28). Thus, the efficacy of YP was found remarkable to manage RA and its long-term impact can be assessed in future researches.

In conclusion, effectiveness of YP intervened has been found in favor of significant improvement of RA symptoms among participants. Intervened YP significantly reduced pain intensity, joint inflammation, early morning stiffness, pulse rate, blood pressure, lymphocyte count, C – reactive protein and uric acid towards normalcy in participants as compared to controls. Thus, this study concluded that yoga can be used as a complementary therapy of RA for its faster healing if accompanied with medication.

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