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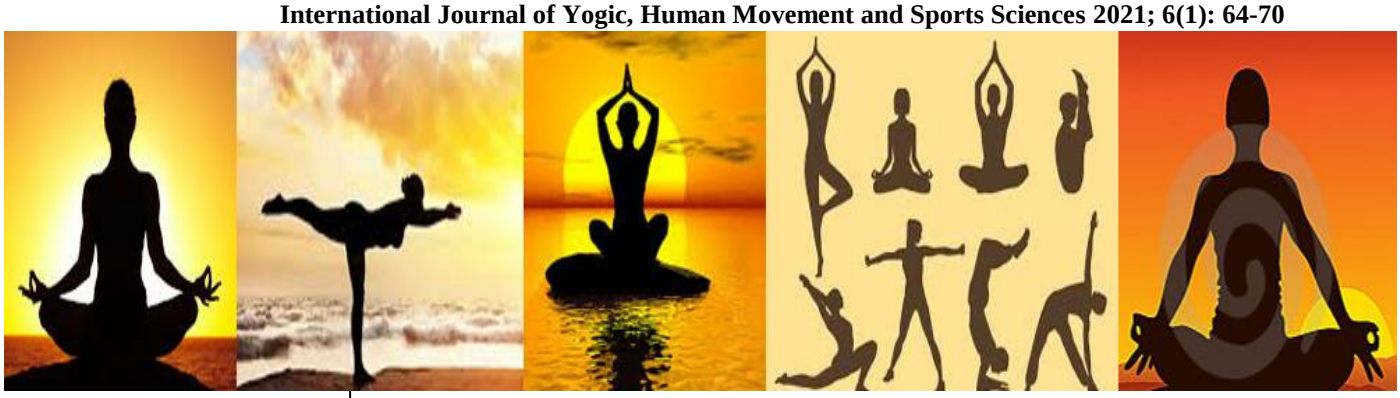

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Causes of occupational stress among IT employees and impact of yogic intervention

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Abstract
Occupational stress has become one of the most serious health issues in the modern world. In this paper, authors attempted to identify the causes of the occupational stress among the employees working in the Information Technology (IT) sector. Through this study an attempt has been made to assess the impact of yogic intervention as a stress management technique among the IT employees. The study was conducted among 30 IT professionals from the age group of 30 to 50 years old, who were not involved in any formal exercise program. The participants in yoga group received a weekly 60-minute yoga class for 12 weeks. The paired T-test results showed a significant decrease in role overload, role ambiguity, role conflict, Unreasonable group and political pressure, under participation, poor peer relations, Strenuous working condition, and overall occupational stress after the yogic intervention. However, there was no significant change in responsibility for persons, powerlessness, Intrinsic improvement, low status, and unprofitability after yogic intervention. This study found that Seventy percent of the IT employees who participated in the survey were suffering with very high stress due to four main factors namely stress among IT employees are Role overload, Unreasonable group/Political pressures, Under participation and Strenuous working conditions.
This study indicates that, majority of employees faced physical as well as psychological stress due to heavy work load and yogic practices have a highly positive impact in the management of stress related problem.

Keywords: Occupational stress, stress factors, IT employees, yogic intervention

1. Introduction
The Information Technology (IT) sector is fast paced service sector and employees have long working hours, tight timelines and heavy workload. The work process are highly dynamic and time bound, as employees have definite targets to meet, that are incubated in different time zones. IT professionals are always under constant pressure to deliver services efficiently, along with being cost-efficient. Indian IT professionals also need to continuously align to the country time zones of customers, which affects their sleep schedules. The current working conditions are prone to generate a lot of job anxiety for most India-based IT professionals as all project contracts are generally of a short-term duration. Occupational stress has become one of the most serious health issues in the modern world, as it occurs in any job. Occupational stress can be defined as harmful physical and emotional responses that occur when the requirements of the job do not match the resources, needs, or capabilities of an employee, leading to poor mental and physical health [1].
K. Krishnamurthy *et al*. [2] had studied various factors concerned with stress, impact of stress in the family, work and individual, management of stress factors and organizational health factors among the IT employees in Chennai. Authors have concluded that, overall IT sector of Chennai is more stressful and aged employees are having more stress factors. Similar conclusion was also reported by Prasad *et al*. [3] where a comparative analysis of occupational stress between employees of International Agricultural Research Institute (IARI) and the employees of Information Technology sector was done. Authors have observed that, the effect of work stress on the performance of IARI employees is moderate as compared with the IT employees. The results of the study indicate that, the work related stress in general and the stress factor job security in particular effects the employees' performance in IT organizations.

Through the study authors have found that, health wise many employees of IT organization had developed chronic neck and back pain, an effect of long sitting hours at work. Sherry Sabbarwal, Monica Munjial Singh, and Mohammad Amiri [4] have reported occupational stress among IT employees working in Pune. They concluded heavy workload, long working hours, family problems, insecurity of job, low monetary compensation are the major causes of their occupational stress.

Yoga is old ancient Indian art, which can be very helpful if a person wants to get rid of their problems, want to live happily, maintain physical and mental health. The yogic lifestyle comprises meditation, breathing techniques, correct postures, low-fat non-spicy diet and behavioral modification. Hartfiel *et al* [5] and Sao, Akhileshwar *et al* [6] states that even a short program of yoga is effective for enhancing emotional well-being and resilience to stress in the workplace.

Adhikari *et al* [7] investigated the effect of yoga on occupational stress of 60 Indian army personnel at 4th Battalion Rajput Regiment, Sahajahapur, UP. The programme spread over for 30 days, scheduled two sessions each day in the morning and evening, each session lasting 1.30 hour. The progamme consisted of an integral yoga practice which included selected Asanas, Pranayamas, Prayer (Omkar & Gayatri Mantra Chanting) and Yoganindra. Participants completed the standard self-reported Occupational Stress Index Test before and after the training programme. Result revealed that participants experienced a statistically significant reduction of stress at work place. Dr. S. Nomusankar and P.V. Balaji deekshitulu [8] studied the impact of yoga on occupational stress of 120 industrial employees working in Chittoor, Andhra Pradesh. He reported significant improvement of Yoga on all the stress factors that is Role overload, Role ambiguity, Role conflict, Unreasonable group &political pressures, Responsibility for persons, Under participation, Powerlessness, Poor peer relations, Intrinsic impoverishment, Low status, Strenuous working conditions, and Un profitability Respectively. Pallavi *et al* [9] had investigated the effect of yoga on occupational stress among IT employees. She had reported significant reduction in the work-related stress after the 12 weeks yoga training. In her report, the mean value of the pre and the post test stress score of the participants were 135.8 and 121.1 respectively, and the paired t-test showed a significant difference between the pre and the post test ($t = 6.0$, $p = 0.0$), indicating the participants demonstrated a significant reduction in their work-related stress after the yogic intervention.

Several studies in the past have established that yoga addresses the issue of stress [5-9], but there is not much work done to identify the main cause of occupational stress among IT employees and investigating the yoga as an alternate therapy to manage the stress. In this paper, attempt is made to identify cause of occupational stress and assessing the impact of yogic intervention on reducing the occupational stress of IT employee.

2. Methodology

The research participants were 30 IT professionals who were not involved in any formal exercise program. The present study adopted a single-group pre-post research design, wherein 30 IT professionals with ages 30–50 years completed the assessments. This experimental study estimated the sample size based on effect size = 0.45, power = 0.8, alpha level = 0.05, two- tailed, and it was calculated to be 28; taking 10% of loss to follow-up into consideration, the sample size was set to be 30. Sample Size calculation for this study was determined according to the calculation used by Kadam *et al* [10].

The intervention in this study was a weekly 60-minute yoga class for 12 weeks. Each yoga class was subdivided into six 10-minute sub-sessions. The fidelity of the yoga intervention was monitored and directed by a qualified teacher. The detailed yoga module for the occupational stress is provided below.

Yogic module for occupational stress 12 week programme

	First four weeks (45 min.)	Second four weeks (1 hour)	Third four weeks (1hr. 15min.)
Loosening of joint			
Spinal twist	15 rounds	30 rounds	45 rounds
Back swing	15 rounds	30 rounds	45 rounds
Hip twist	15 rounds	30 rounds	45 rounds
Hip rotation	15 rounds	30 rounds	45 rounds
Knee stretch	15 rounds	30 rounds	45 rounds
Forward and backward bending	15 rounds	30 rounds	45 rounds

Relax by free walk	2 min.	4 min.	6 min.
SITTING			
Spinal stretch with legs apart	5 round	10 rounds	15 rounds
Back stretch with alternate	5 round	10 rounds	15 rounds
Back stretch with both legs	5 round	10 rounds	15 rounds
Tiger stretch	5 round	10 rounds	15 rounds
QRT			
SUPINE			
Paschimottanasana stretch	1 round	2 rounds	3 rounds
Halasana	1 round	2 rounds	3 rounds
Paschimottanasana and halasana	1 round	2 rounds	3 rounds
stretch Cycling	1 round	2 rounds	3 rounds
Side leg raising (each leg)	1 round	2 rounds	3 rounds
Alternate leg raising (each side)	1 round	2 rounds	3 rounds
Naukasana	1 round	2 rounds	3 rounds
PRONE			
Dhanurasana swing	1 round	2 rounds	3 rounds
Shalbhasana (both legs)	1 round	2 rounds	3 rounds
Alternate bhujangasana and parvatasana	1 round	2 rounds	3 rounds
Vibhagiya pranayama (sectional breathing)	2 rounds	4 rounds	6 rounds
Chandranuloma viloma (3 times in a day)	15 rounds	30 rounds	40 rounds
AAA chanting	5 rounds	10 rounds	15 rounds

The research tools of the study consisted of Occupational Stress Questionnaire. Occupational stress index questionnaire was developed by Dr. A.K. Srivastava and Dr. A.P. Sinha, Banaras Hindu University [11]. This questionnaire consists of 46 items. Occupational Stress Index (OSI) Questionnaire was rated on a 5- point scale. Questionnaire consisted of positive and negative key item. The response alternatives ranged in five categories from "Strongly Disagree, Disagree, Undecided, Agree to Strongly Agree". The participants were asked to respond to each question by choosing one out of five levels of perceptions, from 1 (*Strongly disagree*), 2 (*disagree*), 3 (*undecided*), 4 (agree), to 5 (*Strongly agree*). A higher score indicates higher stress levels. The total score of an individual questionnaire indicate whether employees are low stressed, moderately stressed and highly stressed. As per the OSI, scores in between 46-127 indicate low stress; scores in between 128-150 indicate moderate stress and scores more than 150 indicate high stress. It measures stress in 12 dimensions namely Role Over load, Role ambiguity, Role conflict, Unreasonable groups and political pressures, Responsibility for persons, Under participation, Powerlessness, Poor peer relations, Intrinsic impoverishment, Low status, Strenuous working conditions and Un Profitability. Before and after the yoga intervention, all participants were asked to complete the questionnaire including: demographic characteristics (e.g., gender, age,

marital status, educational status, and years of work), professional background, work-related stress scale. The dependent variable was the difference of total score of posttest score minus pretest score of work-related stress, respectively.

Research data collected from the participants by questionnaire were coded and double- checked. Data analyses were carried out by using Minitab version 19.0. Paired t tests were used to compare the differences of the pre and post mean OSI score.

3. Results & Discussion

Total number of participants included in this study were 30. There were no dropouts during the treatment period. To identify the main factors causing stress among IT employees, data are arranged in 12 subscales /categories, namely Role Over load, Role ambiguity, Role conflict, Unreasonable groups and political pressures, Responsibility for persons, Under participation, Powerlessness, Poor peer relations, Intrinsic impoverishment, Low status, Strenuous working conditions and Un Profitability. The Anderson-Darlington (AD) test was used to assess the normality of distribution of investigated variables. Paired t-test was used to compare the mean scores of the occupational stress and its domains within the group. Statistically significant level was set as 0.05. Table 1 represents the result of Normality test of the pre and post stress of the 12 subscales category. In the table pre score is by denoted by _1 and post score is denoted by_2.

Table 1 shows the summaries of pre and post stress scores according to the stress subscales. During Normality test confidence interval of 95% is chosen i.e. significance level is 0.05. Since most of the data shows p value higher than 0.05 (significance level) therefore most of the data's are normally distributed. The p-value of two pre stress subscales, Unreasonable groups- political pressures, Under participation, and 1 post stress subscale Strenuous working conditions are lower than 0.05 therefore these 3 data are not normally distributed. Since sample size is more than 20 and combined pre-post data of the subscale category satisfies the normality condition therefore overall data is considered to be normally distributed.

Table 1: Summary of Normality Test results of pre and post stress scores according to the stress subscales.

Graphical Summary of Role ove_1, Role ove_2, Role amb_1, Role amb_2,...
Descriptive Statistics Report

Group	N	Mean	95% CI	StDev	95% CI	Min	Median	Max	Normality Test P	Normality Test Decision
Role ove_1	30	25.833	(24.814, 26.853)	2.7302	(2.1744, 3.6703)	20	26	30	0.150	Pass
Role ove_2	30	21.733	(20.738, 22.728)	2.6644	(2.1219, 3.5817)	16	22	27	0.428	Pass
Role amb_1	30	13.567	(12.618, 14.516)	2.5418	(2.0243, 3.4170)	10	14	18	0.078	Pass
Role amb_2	30	10.567	(9.6175, 11.516)	2.5418	(2.0243, 3.4170)	7	11	15	0.078	Pass
Role con_1	30	19.6	(18.505, 20.695)	2.9314	(2.3346, 3.9407)	14	20	24	0.155	Pass
Role con_2	30	17.667	(16.694, 18.639)	2.6042	(2.0740, 3.5008)	12	17	22	0.209	Pass
Unreason_1	30	15.933	(15.200, 16.667)	1.9640	(1.5642, 2.6403)	12	15.5	19	0.006	Fail
Unreason_2	30	13.333	(11.970, 14.697)	3.6515	(2.9081, 4.9087)	7	12.5	20	0.121	Pass
Responsi_1	30	7.8667	(6.9173, 8.8161)	2.5425	(2.0249, 3.4179)	4	8	12	0.057	Pass
Responsi_2	30	7.2333	(6.2543, 8.2124)	2.6220	(2.0882, 3.5248)	2	7.5	11	0.167	Pass
Under pa_1	30	16.133	(15.314, 16.952)	2.1930	(1.7465, 2.9481)	10	16	20	0.037	Fail
Under pa_2	30	13.567	(12.618, 14.516)	2.5418	(2.0243, 3.4170)	10	14	18	0.078	Pass
Powerles_1	30	7.3667	(6.4653, 8.2680)	2.4138	(1.9224, 3.2449)	3	7	11	0.188	Pass
Powerles_2	30	6.7333	(5.7482, 7.7185)	2.6384	(2.1012, 3.5468)	1	7	12	0.817	Pass
poor pee_1	30	10.7	(9.5516, 11.848)	3.0755	(2.4493, 4.1344)	5	11	16	0.406	Pass
poor pee_2	30	6.7333	(5.7482, 7.7185)	2.6384	(2.1012, 3.5468)	1	7	12	0.817	Pass
Intrinsi_1	30	12.9	(11.540, 14.260)	3.6422	(2.9007, 4.8962)	6	13.5	19	0.460	Pass
Intrinsi_2	30	11.2	(9.8684, 12.532)	3.5661	(2.8401, 4.7940)	3	12	17	0.067	Pass
Low stat_1	30	7.0667	(6.0526, 8.0807)	2.7156	(2.1628, 3.6507)	3	7	12	0.237	Pass
Low stat_2	30	7.1	(6.1325, 8.0675)	2.5911	(2.0636, 3.4833)	2	7	12	0.389	Pass
Strenupi_1	30	16.3	(15.799, 16.801)	1.3429	(1.0695, 1.8053)	14	16	18	0.010	Fail
Strenupi_2	30	13.333	(11.970, 14.697)	3.6515	(2.9081, 4.9087)	7	12.5	20	0.121	Pass
Unprofit_1	30	5.4333	(4.6821, 6.1845)	2.0117	(1.6022, 2.7044)	2	5	9	0.089	Pass
Unprofit_2	30	4.4667	(3.4488, 5.4845)	2.7258	(2.1708, 3.6643)	0	4	11	0.484	Pass

To determine which factors are mainly contributing to the occupational stress, bar chart method is used. In the x-axis of the bar chart, normalized stress (in%) is plotted and normalized frequency (%) is shown in the Y axis. Normalized stress of the subscale in% and normalized frequency in% is defined by the below formula

Normalized Stress = 100x (Subscale stress Score of the participant / Total score of the subscale)

Normalized frequency = 100x (no of employees with same score / total employees)

For example, if a participant gets score 24 in the Role overload category and total score of the Role overload category is 30 (6 questions with max 5 marks each for a question) then normalizes stress score of the participant is 100x(24/30) = 80%

If 5 participants out of total 30 get score of 24 in Role overload category then Normalized frequency is 100*(5/30) = 16.67%

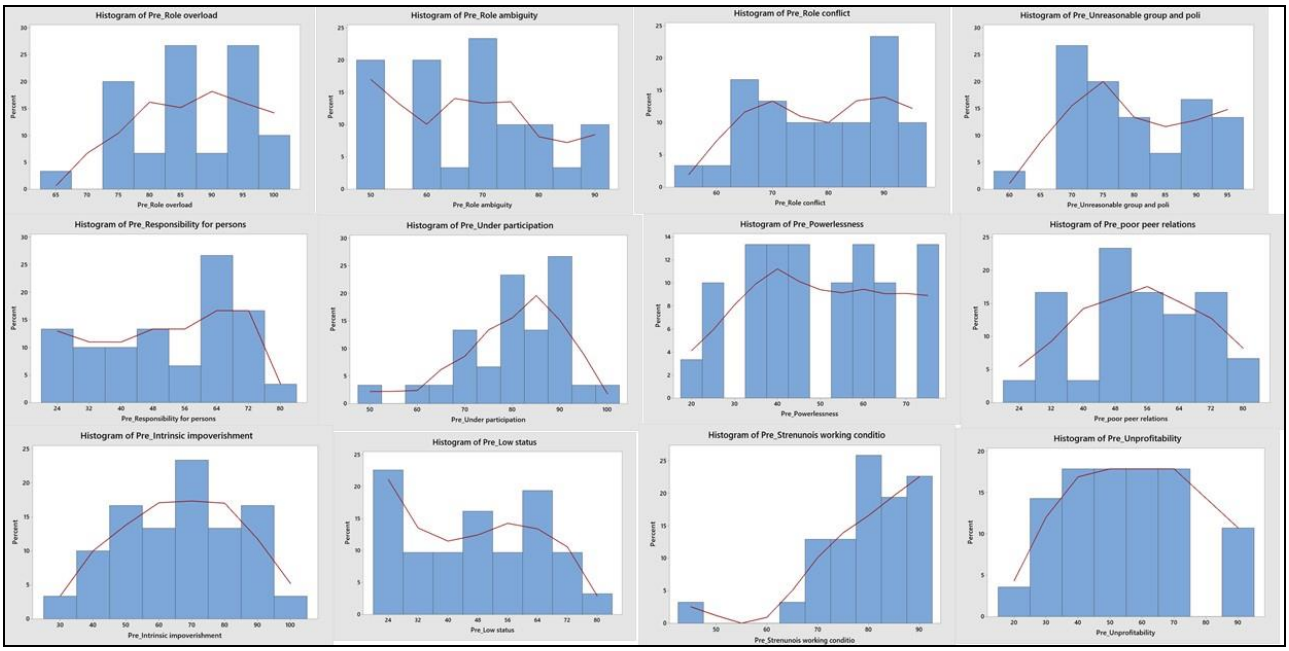

Fig 1: Graphical distribution of the pre stress score according to the stress subscales

Figure 1 represents the graphical distribution (as a bar charts) of pre stress scores in 12 subscale categories. We used these bar charts to determine which stress factors out of the 12 subscale categories are most prominent. For example, to know how much% of the participants have stress higher than 70% or more due to work overload, the bar chart of the role overload is seen, then in the x axis we take all the bars above 70% and sum up their corresponding normalized frequency value from the Y axis i.e. (20% participants with 75% stress + 6% participants with 80% stress + 27% participants with 85% stress +6% participants with 90% stress +27% participants with 95% stress + 10% participants with 100% stress) therefore one can say that 96% of the participants showed higher than 70% stress.

It can be concluded from figure 1 that main factors of stress among IT employees are Role overload, Unreasonable group/Political pressures, Under participation and Strenuous working conditions. Seventy percent of the IT employees who participated in the survey were suffering with very high stress due to these 4 factors mainly. These findings are in agreement with Anuradha Nakka and N.V. Naidu *et al* [12] who have provided an overview of the challenges and stress observed by IT women employees in Vishakhapatnam. They concluded that in majority of IT organizations, there are a poor working conditions, heavy workload and lack of employees' participation in management.

To see the impact of Yoga training on occupational stress among IT employees, Paired t-test was used to compare the pre and post mean scores of occupational stress and its domains within the group. Statistically significant level was set as 0.05. In Figure 2, Box plot comparison is used between Pre and post stress scores of participants according to 12 subscales category.

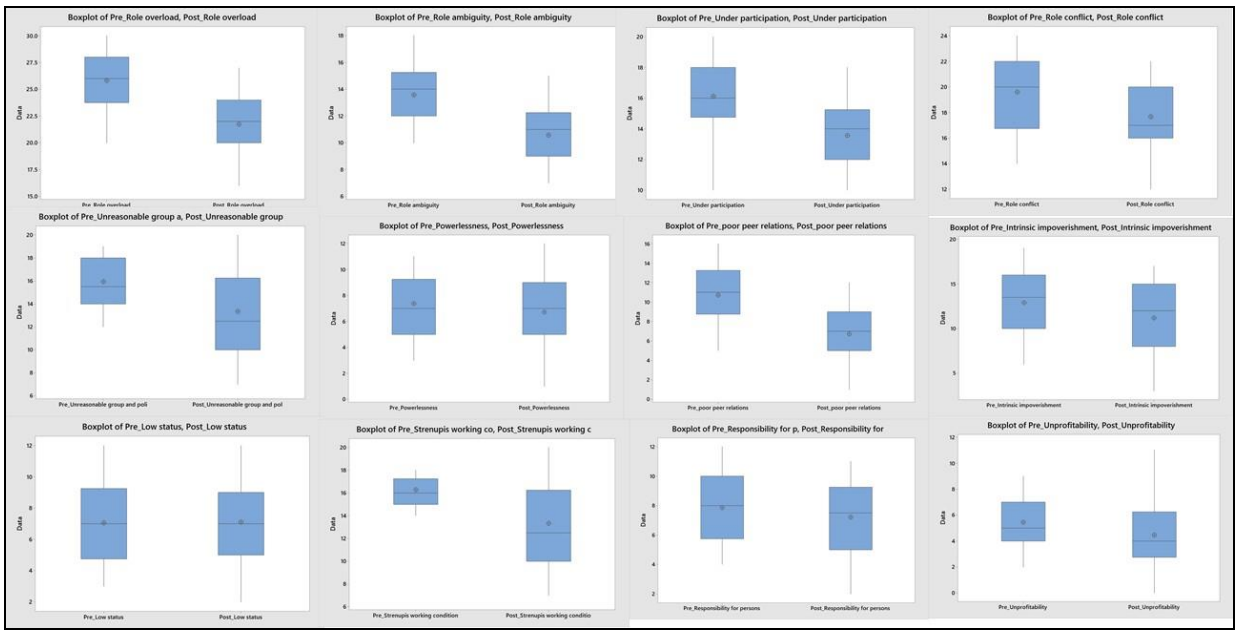

Fig 2: Box plot comparison of the pre and post occupational score of Role Over load, Role ambiguity, Role conflict, Unreasonable groups and political pressures, Responsibility for persons, Under participation, Powerlessness, Poor peer relations, Intrinsic impoverishment, Low status, Strenuous working conditions and Un Profitability

The IT employees showed a significant decrease in role overload, role ambiguity, role conflict, Unreasonable group and political pressure, under participation, poor peer relations, Strenuous working condition, and overall occupational stress after the yogic intervention. However, there was no significant change in responsibility for persons, powerlessness, Intrinsic improvement, low status, and unprofitability after yogic intervention. The details are presented in Table 2.

Table 2: Summary of paired T-Test results of various stress categories

	Mean		Stdev				Conclusion
OSI Category	**Pre**	**Post**	**Pre**	**Post**	**t value**	**p value**	
Role overload	25.83	21.73	2.73	2.664	5.6	0.0000	significant improvement
Role ambiguity	13,567	10,567	2,542	2,542	3.65	0.0000	significant improvement
Role conflict	19.6	17.66	2.931	2.604	2.93	0.007	significant improvement
Unreasonable group and politica	15.933	13.333	1.964	3.651	4.76	0.0000	significant improvement
Responsibility for persons	7.867	7.233	2.543	2.622	1.18	0.2480	No change
Under participation	16.133	13.567	2.193	2.542	4.17	0.0000	significant improvement
Powerlessness	7.367	6.733	2.414	2.638	1.01	0.319	No change
poor peer relations	10.7	6.733	3.075	2.638	6.16	0.0000	significant improvement
Intrinsic impoverishment	12.9	11.2	3.642	3.566	2.02	0.053	No change
Low status	7.067	7.1	2.761	2.591	-0.05	0.9530	No change
Strenupis working condition	16.3	13.33	1.343	3.651	4.68	0.0000	significant improvement
Unprofitability	5.433	4.467	2.012	2.761	1.33	0.1940	No change
Total Stress Score	**158.7**	**111.93**	**7.77**	**15.45**	**17.75**	**0.0000**	**significant improvement**

The overall stress among the software professionals after 12 week yogic invention was significantly reduced which is concluded by high t value of 17.75 and p value <0.05. Since employees can not change the external conditions and behavior of their supervisor and coworkers therefore some of the stress factors such as responsibility for persons, powerlessness, Intrinsic improvement, low status, and unprofitability were not changed and no significant change was found by statistical t-test. Yogic intervention helps employees to change their way of dealing the difficult situations with more efficiently and calmly. The results of this study is in with agreement with Verma *et al* [13] who did similar studies on the school principals. The principals showed a significant decrease in role overload ($P< 0.001$), role ambiguity ($P< 0.01$), role conflict ($P< 0.05$), under participation ($P< 0.001$), powerlessness ($P< 0.001$), intrinsic impoverishment ($P< 0.01$), law status ($P< 0.001$), and overall occupational stress ($P< 0.001$) after 7 days of yoga training intervention. However, there was no significant change in unreasonable group and political pressure ($P> 0.05$), responsibility for persons ($P> 0.05$), poor peer relations ($P> 0.05$), strenuous working conditions ($P> 0.05$), and unprofitability ($P> 0.05$) after yoga training intervention.

4. Conclusion

Our results showed main factors of stress among IT employees are Role overload, Unreasonable group/Political pressures, Under participation and Strenuous working conditions. Seventy percent of the IT employees who participated in the survey were suffering with very high stress due to the above 4 factors mainly. A significant decrease in role overload,

role ambiguity, role conflict, Unreasonable group and political pressure, under participation, poor peer relations, Strenuous working condition, and overall occupational stress after the 12 week yoga training. In majority of IT organizations there is an absence of training programs pertaining to the implementation of programs for reducing occupational stress among IT employees. Yoga can be used as a stress management techniques to prevent and reduce stress levels of employees' physical body and psychology; and thereby improve day to day activities of the employees at the work place and in the family also. Overall, we found the practice of yoga safe, when practiced under guidance of a trained teacher, and have no side effects.

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