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An observational study of *hetus* of musculoskeletal pain in IT (Information Technology) professionals

Research Article

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Abstract

Background & Objective: The IT-BPO industry employees often suffer the musculoskeletal disorders (MSD). Hence the objective of this entitled study was to observe the *Ayurvedic hetus* (causes) for these MSDs. Methods : A cross sectional survey study was conducted on IT employees using a questionnaire on 223 subjects along with pilot study on 23 subjects. On the basis of the pilot study, validity and reliability of questionnaire was checked. Result : High incidence of low back trouble was observed (75.33%) as compared to shoulder and neck troubles. The presence of causes – *Vishamasana* (wrong posture), lack of exercise and *Atishrama* (physical and mental exertion) were very high. Higher observations were also found for the – *ratri jagarana* (night vigil) and *kshudha vegadharana* (postponing the meals). A comparative study of lifestyle factors among males & females showed that, more haphazard and faulty lifestyle was present in males. Conclusion : *Vishamasana* and *Atishrama* are major causes of these MSDs while high AC exposure, lack of exercise, *ratri jagarana* and *kshudha vegadharana* acts as *Viprakrishta hetus* (long term causes) for MSDs.

Key Words: Musculoskeletal disorders*, Vishamasana, Atishrama, Ratri jagarana, Kshudha vegadharana.*

Introduction

After taking birth in Mumbai in 1967, the IT industry flourished so fast than any other industry. This industry has great impact on Indian economy today – India's IT-BPM industry showed the growth of 6.1% in revenues i.e. 177 billion USD with exports growing at 8.3% i.e. 136 billion USD. The IT-BPM employee number stands at 4.14 million (1). Behind this economical glamour, lies another side of unhealthiness. Employees in ITES (IT enabled Services) undergo high stress in their work environment which raises serious concerns about work in IT industry. This issue is now getting an attention of research workers. Research carried out by A K Sharma, S. Khera and J. Khandekar on 200 IT employees showed that magnitude of computer related problems were as high as 93%. There were visual problems in 76%, musculoskeletal problems in 77.5% and stress in 35% of subjects (2). In these health problems, musculoskeletal disorders gain importance due to their early start, having long period of influence and morbidity. Now days they are being called as – Work Related Musculoskeletal Disorders (WRMD), Repetitive Strain Injury (RSI), Cumulative Trauma Disorder (CT), Occupational Overuse Syndrome. They include low back-ache, neck pain-stiffness, shoulder pain, Carpal-Tunnel syndrome etc. If we see these from Ayurvedic perspective they are the signs of *Vata prakopa* as – *Kati shoola* (Low backache), *Manya shoola* (neck pain), *Amsa shoola* (shoulder pain) (3). So anything that causes *vata prakop* will predispose these conditions. These causes told in Ayurvedic texts acts as *Viprakrushta hetus* (Long term causes) while wrong posture which has been the main concern of today's research workers, acts as *Nimitta karan* (Short term/stimulatory causes). As Ayurveda is *Tri-Sutra*, before management of any disease, understanding its causes (*Hetus*), signs and symptoms (*Linga*) is of prime importance. Hence present study aims at understanding these various causes leading to MSDs.

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Materials & Methods

A cross sectional observational study was carried out on 223 subjects. Before that, a pilot study was also conducted for the reliability and validity of the questionnaire.

Sampling

The previous studies on musculoskeletal problems had shown prevalence of 77.5%, considering this and expected proportion to be 85%, with 'α' at 0.05 and 'β' at 0.2, minimum required sample size was 223 calculated by MedCalc Software Ver.9.2.0.2.

Sampling was done by – simple random type.

Inclusion criteria

Any employee who is –

1) Of age 21 – 35 yrs.
2) Of either sex.
3) Working for ≥ 2 yrs in company.
4) Works for ≥ 5 hrs/day.
5) Developed symptoms after joining the company.

Exclusion criteria

Any employee who is –

1) Of age < 21 yrs and > 35 yrs.
2) Working for < 2 yrs in company.
3) Works for < 5 hrs/day.
4) Symptoms present before joining.
5) Having chronic diseases.
6) Having musculoskeletal pain caused by any *Agantu Hetu* (external factors) like fractures, injuries etc.

Questionnaire

A questionnaire was provided to respondents, consisting of 2 parts:

1) Related with the complaints of *Kati shoola, Manya shoola and Amsa shoola* i.e. musculoskeletal pain – 'Standardized Nordic Questionnaire' was used for this (4).
2) Related with the *Hetus* – On the basis of the *hetus* of *vatavyadhis* mentioned in *Ayurvedic* texts, this part of questionnaire was constructed (5),(6).

The Performa in questionnaire was prepared by taking into account the textual references from *Brihattrayee.*

Pilot study

A pilot study was carried out on 23 subjects (i.e. 10% of the total sample population as per statistical rules) for the assessment of the questionnaire i.e. validity and reliability.

- Validity: The validity of the questionnaire was carried out by the method, 'Expert validity'. As there was no standard questionnaire available for the *hetus* of MSDs from Ayurvedic perspective, the questionnaire was given to the expert faculties of *Samhita & Siddhand* department of Ayurveda. On the basis of the suggestions made by the experts, questionnaire was updated and validated.

- Reliability: The reliability of the questionnaire was calculated by Split – half method, calculating *Spearman-Brown Prophecy coefficient* with the help of SSPS software. The value of the *Spearman-Brown Prophecy coefficient* should be ≥ 0.8 (which ranges 0.1 to 1.0) for the questionnaire to call it reliable for the study, as per the statistical rules but for exploratory research it is can be reduced to ≥ 0.6. It was found to be 0.73 and hence questionnaire was found to be reliable for the further study.

Observations & Result

All the subjects, being in the profession of IT, belong to the same socio-economic status. All the subjects were expected to be well educated as they are working in this profession and hence can understand the questionnaire. The survey was done on employees from different IT companies so as to remove the bias, so that different subjects from the different working environment would be selected. From total sample population, male population was 139 (62.33%) and female population was 84 (37.66%). The ratio was found to be 1:1.65. Mean age was found to be 30.56 (± 2.007). More population was found in the group – 25 to 30 yrs (56.95%). The subjects working for ≥2 yrs were selected. The subjects were divided into 3 groups according to their working years, 1-5 yrs, 5-10 yrs and >10 yrs. More number of subjects was found in the group working for 1 to 5 yrs (74%). And min. number was found in group working for >10 yrs (1.34%). The subjects working for at least ≥5 hrs/day or ≥35 hrs/week were selected. The range of actual working hrs was observed much higher than this min. accepted working range for the main study. The subjects were distributed into 3 groups according to working hrs. – 40-45 hrs/wk, 46-50 hrs/wk and >50 hrs/wk. The sample was not equally distributed. More no. of subjects was observed in the group – 46 to 50 hrs (80.26%).

Prevalence of MSK pain (Table 1)

As expected, prevalence of low back was highest (75.33%). The MSK (musculoskeletal) trouble was observed less in shoulders (33.18%). The neck pain was observed in 47.98% subjects.

Comparing the prevalence in both sexes, the prevalence of neck trouble was somewhat similar. But shoulder trouble was more observed in males. Low back was higher in both the groups. (Table 1)

Table 1: Prevalence of MSD in males & Females

Sex	Neck	Shoulder	Low back
Females	40 (47.61%)	17 (20.23%)	63 (75%)
Males	67 (48.20%)	57 (41%)	105 (75.53%)

Observations of causes

Sleep schedule

The time of sleep ≥ 12.00 am was considered as *ratri jagarana*. It was observed in 52.46 % of total sample population. 45.29 % of the total sample population was observed to have irregular sleep schedule.

Bowel habits

This *hetu* was studied under 2 headings –

1. Regular/irregular bowels.
2. Suppression of urges.

Irregularity of bowel was observed only in 44.40% of total sample population. The suppression of urges was found only in 26.90% of total population.

Exercise

Only 17.04% of total sample population does the regular exercise. Hence lack of physical activity is very high in IT employees.

Travelling

The hetu '*yanayana'* was studied under 3 heading

1. Distance to be travelled daily for the work.
2. Mode of transport.
3. Exertion due to travel.

- Distance: Mean of the observations was found to be – 12.28 (±1.99). Max. and min. observation in this criteria was 7 and 18 kms respectively. After studying the distribution, it was divided into 3 groups – 71.30% of the sample populations have to travel between 11 to 15 kms for their work. Least observations were found in the group ≥ 15 kms.
- Mode of transport: The subjects were asked to choose between the 3 responses – pick & drop or own vehicle or public transport. 79.82% of the sample populations use their own vehicle for the transport. 16.59% and 3.58% of the sample population use pick & drop and public transport for the same.
- Exertion (Table 2)

Table 2 : Travelling by IT employees

	Exertion by Travel		
Group	**Yes**	**No**	**Total**
<15 Kms	42	156	198
≥15 Kms	14	11	25
Total	56	167	223

Only 25.11% of the sample populations feel the exertion due to travelling. The travelling distance and exertion were then tested for the significance by chi-square test –

The $\chi 2$ value was found to be 12.49 (p=0.0004) at df = 1, proving the test to be significant.

AC exposure

Avg. AC exposure was 8.33 hrs/day.

Posture

The 3 criteria were given to respondents. If they fulfill all these criteria, then only it was accepted that they follow the proper ergonomic rules for working on PCs. Only 28.25% of the sample populations were found to fulfill all these criteria.

Diet pattern (Fig. 1) (Table 3)

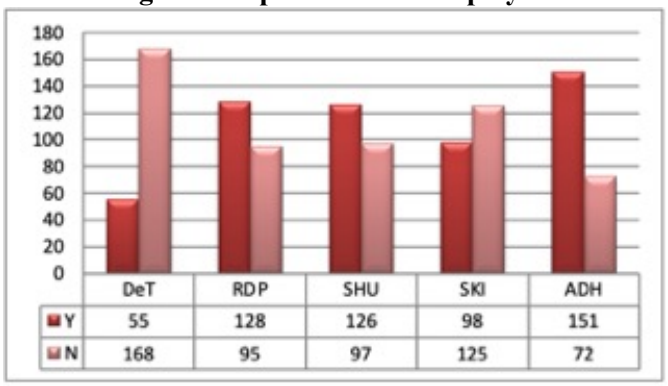
Diet pattern was observed under following headings –

1. Timings of lunch and dinner.
2. If it's regular throughout a week.
3. Hunger during lunch/dinner.
4. Shuffling of lunch/dinner.
5. Skipping of lunch/dinner.
6. Frequent eating

Table 3 : Diet pattern of IT employees

Diet Pattern	Frequency		%	
	Yes	**No**	**Yes**	**No**
Delayed timings	55	168	24.66	75.33
Regular timings	128	95	57.39	42.60
Shuffling of lunch/dinner	126	97	56.50	43.49
Skipping of lunch/dinner	98	125	43.94	56.05

Fig. 1: Diet pattern in IT employees



(DeT = Delayed timings, RDP = Regular Diet Timing, SHU = Shuffling of timings, SKI = Skipping of lunch/ dinner, ADH = *Adhyashan*)

Physical and mental exertion

Physical exertion

70.40% of the sample population feels some sort of physical exertion in the week.

Again this population was distributed in 3 groups according to response –

a. At the end of week – 72.61%
b. Alternate days – 27.39%
c. Daily – 0

Mental exertion

57.84% of the sample population feels mental exertion in the week.

Again this population was distributed in 3 groups as mentioned above

a. At the end of week – 78.29%
b. Alternate days – 21.71%
c. Daily – 0

In order to rule out, that this exertion is not due to age and working years, chi – square test was applied. The $\chi 2$ values for physical and mental exertion are 1.18 (p=0.27) and 0.83 (p=0.36) with df = 1, which are less than values in chi – square table, hence chi – square test is not significant. This shows that there is no relation between working years and exertion.

Comparative study of lifestyle of males & females (Fig. 2) (Table 4)

As mentioned already, there was little higher % of MSK pain prevalence in males compared to females. For finding reasons for these observations, lifestyle of males and females was compared on the basis of *hetus* mentioned in questionnaire.

- *Ratri jagaran: The $\chi 2$ value was found to be 29.33 (p<0.0001), which was much higher than values in the chi-square table for df = 1. So, chi-square test was significant and proves that jagaran is more in males.*
- Regular sleep pattern: The $\chi 2$ value was found to be 38.86 (p<0.0001), with df = 1. So, the test is significant and proves that irregularity is more in males.
- Regular diet pattern (Fig. 2): The $\chi 2$ value was observed to be 9.94 (p=0.0016), when df = 1. The test

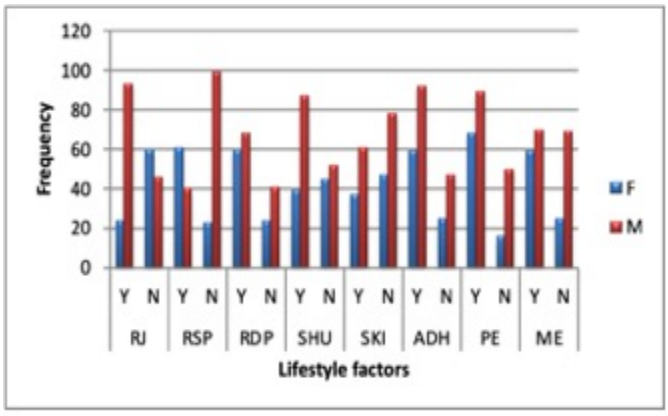
is significant. It shows that irregularity of diet is more in males.

- Shuffling of diet: The $\chi 2$ value for the shuffling of lunch/dinner was 4.92 (p=0.026) with df = 1. Hence shuffling occurs more in males than females but may vary as p is not less than 0.01.
- Skipping of lunch/dinner: The $\chi 2$ value for this was 0.013 (p=0.090) when df = 1. It shows that there is no difference in males & females pertaining to skipping of lunch/dinner.
- *Adyashan* (Frequent eating): The $\chi 2$ value was 0.23 (p=0.631), with df = 1. So test in not significant.

Table 4 : A Comparative study of lifestyle of males & females

	Response	Females	Males	Chi-square value
Night vigil	Yes	24	93	29.335
	No	60	46	
Regular sleep pattern	Yes	61	40	38.86
	No	23	99	
Regular diet pattern	Yes	60	68	9.94
	No	24	71	
Shuffling	Yes	39	87	
	No	45	52	4.92
Skipping	Yes	37	61	0.013
	No	47	78	
Adhyashan	Yes	59	92	0.23
	No	25	47	
Physical exertion	Yes	68	89	6.40
	No	16	50	
Mental exertion	Yes	59	70	7.68

Fig. 2: Comparative study of lifestyle factors in males and females



(RJ = *Ratri Jagaran*, RSP = Regular Sleep Pattern, RDP = Regular Diet Pattern, SHU = Shuffling, SKI = Skipping, ADH = *Adhyashan*, PE = Physical exertion, ME = Mental exertion)

So, difference in these two groups in not significant and both males and females are exposed to this hetu.

Along with these, AC exposure and wrong posture were also found as important causes for MSK pain.

Discussion

MSK pain has tremendous personal and social impact leading to reduced quality of life with possibility of loss of work and social networks (7). The development of MSK pain among computer users is related to multiple factors. Individual, physical, psychosocial and organizational factors are reported to play an important role in development of WRMDs. These factors interact in a complex manner in many occupations including office work (8). Currently the level of association between the extent of computer use and WRMDs is still under debate. Recent studies with objective and quantitative measurement of computer use have failed to demonstrate an association between mouse and keyboard use (exposure) and prolonged pain or chronic pain (9). Office workers often report work related discomfort and pain even though, to date, no clean relation between computer use and neck/upper extremities disorders has been found. Thus studying the relationship between pain intensity duration and localization in relation to physical, psychosocial, organizational and individual factors will contribute to a better knowledge of MSK pain reported by computer users. This is further substantiated by the multi-factorial origin of WRMDs (10). While concerning Ayurveda; *vata* is independent of all, as it doesn't expect any other factor in a body to stimulate it, to start up the physiological or pathological process. It is important in both normal body developments as well as in disease progression. More haphazard lifestyle was observed in males compared to males. It can be said that males are more prone to deranged lifestyle patterns. It may explain the little higher prevalence of MSK symptoms in males than females. So, MSDs in IT professionals are multi-factorial and only one *hetu* can't be blamed. It was observed that incidence of *Atishrama* was large in the sample population and it acts at both physical and psychological levels. In descending order, lack of exercise, high AC exposure and deranged sleep schedules are also observed to play their role in producing MSDs in IT field employees. Along with these major factors, irregular diet pattern – including *kshudha vegadharana* and *adhyashan*a predisposes these MSDs. The incidences of *Vegadharana* and *Yanayana* were much less than expected. They may not be among the prime causes of MSDs. Hence, it can be said that – the above mentioned *hetus* affects *sharir* and *strotas*, making them weak and vulnerable to MSDs and ergonomical factors such as deranged postures, repetitive movements acts as *Nimitta karan*a.

Conclusion

The prevalence of Low back troubles (pain, ache, discomfort) is higher than neck and shoulder troubles. There is no significant difference in the prevalence of MSDs in females and males except shoulder troubles. Males in IT profession are more prone to faulty lifestyle patterns as compared to females. Musculoskeletal disorders in IT professionals are of multi-factorial origin and no one *hetu* can be blamed as a single cause. These MSDs have both *Sannikrishta* (Short term

causes) and *Viprakrishta hetus*. *Vishamasana* (Lack of proper posture during work on computers), acts as a *Sannikrishta hetu* or as a *Nimitta karan*. It is directly responsible for *Vyadhi-Udbhav* or *Abhivyakti*. *Atishrama* is a major cause of MSDs in IT professionals, at both levels – physical & psychological. High AC exposure, *Ratri jagarana*, *Adyashana*, *Kshudha vegadharana* and *Avyayam* are major 'predisposing factors' for MSDs in IT professionals. *Yanayan* and *Vegadharan* do not have major impact on the occurrence of MSDs. The *hetus* mentioned in Ayurvedic texts for *Vatavyadhi* does act as the causes for MSDs in IT professionals. Though, they have a cumulative effect and they cause MSDs only after a long period of exposure.

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