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Research Article

Prevalence of Musculoskeletal Disorder in Casual Workers and Associated Low Intrinsic Motivation: An Empirical Study of Sugar Factories

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ABSTRACT

This cross-sectional study examined associations and effect between low intrinsic motivation, engagement efficacy and the prevalence of musculoskeletal disorders among blue-collar employees of sugar factories. Total participants of this study were 684 blue-collar employees of sugar factories and they completed medical record report and questionnaire yielding information on demographic variables, BMI, and physical job factors. The relationship and effects of physical and social factors with musculoskeletal disorders was analyzed by Pearson product moment correlation, odd ratios, chi square tests logistic regression models. In this study, we have discussed and analyzed the impact of intrinsic motivation of blue-collar employees as repercussions of chronic back strains and sprains injuries (MSD) working in sugar factories at Sindh province of Pakistan. This article entails statistical significance of the musculoskeletal disorders on employees' productivity and engagement performance. This study was statistically evaluated by using data retrieved by the employees of seven different sugar factories. The subject populations have been prone to hopelessness, sleeplessness, loss of supportiveness, engagement efficacy and intrinsic motivation due to musculoskeletal disorders or back sprain and strain. We identified relationship between lower intrinsic motivation and engagement efficacy with loss of support of co-worker, supervisor, sleeplessness, hopelessness and back strain and sprain. This study yielded significant results and produced valid proportions among latent and observed variables. This study also opens the new research arena to combine social, behavioral and medical research relationship and to examine its possibilities and effectiveness.

Keywords: Back strain; Sprains; Musculoskeletal disorders; Intrinsic motivation; Engagement efficacy; Blue-collar employees; Sugar factories

INTRODUCTION

Numerous studies suggest conceivable models scientific evidence indicating that work organization factors are associated with the development of work-related musculoskeletal disorders pertaining to the neck and upper limbs [1]. In the world of work, muscles strain is the common cause of axial or mechanical pain and it commonly confined to the lower back area, workers' beliefs and values about work and what work requires of them, have been associated with musculoskeletal discomfort at work. The causes of musculoskeletal disorders (MSD) are complex and include personal, biomechanical, and psychosocial factors. Although an initial evaluation of a job may involve identifying factors in the workplace design or administrative procedures that can contribute to the development of MSDs, these are not the only areas that need assessment. [2]. Work-related diseases specify significant variations, this is partly due to diverse administrative measures and the deficient knowledge about the pathophysiological mechanisms which cause work related musculoskeletal disorders [3]. Most ergonomic improvements reduce the physical workload and the levels of energy expenditure that are needed. "Postural stress is probably the most important problem to tackle whereas a reduction of the physical workload may be a double-edged weapon. It may justify a less physically fit workforce. But if their levels of physical fitness are determined by work rather than leisure, they are thus exposed to some risk whenever the load is unexpectedly high; unaccustomed activity being a major source of musculoskeletal symptoms" [4].

We have observed that the lumber muscle strains and sprain are the most common work-related injuries which particularly reported by an employee who is generally engaged in manual work in the industry and such musculoskeletal disorders include a wide array

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of degenerative and inflammatory conditions that affect this system (i.e., muscles, joints, tendons, ligaments, as well as peripheral nerves and the supporting blood vessels).

A partial listing of these associated conditions includes tendon inflammations, such as bursitis; nerve compression disorders, carpal tunnel syndrome; osteoarthritis; and low back pain. Musculoskeletal Disorders (MSD) risk factors normally exposed to a blue color employee when employee begin to complaint about sleeplessness, hopelessness, anxiety, fatigue and such complications effects recovery system of the body which creates musculoskeletal imbalance and disorders. Whilst also highlights these musculoskeletal disorders are the single largest category of work-related illness in industrialized countries today [5]. Indeed, occupational musculoskeletal pain and disability disorders, especially when they become chronic in nature, are highly prevalent and costly in industrialized regions [6]. Spine prone to an injury because it subject to strong forces like twisting, sudden jolts, stresses such as excessive sitting in poor postures and chronic back strains and sprains can be very hampering during the performance of the job and in many cases, it is particularly debilitating.

The obvious reasons of strain are coherently linked with the excessive weight bearing and movement functions, heavy items' twisting and bending in awkward postures. Sometimes it is hard to identify causes of the lower back pain due to the anatomical structure of the body; however, whilst working on different machines in abnormal conditions caused lumber muscles fibers stretched or torn which resulted in muscle strains. Although the reason of lumber sprain is tearing of tissue (ligaments) from their attachment and such injuries normally occurs during sports, sudden movements or from gradual overuse. Due to strain or sprain of lumber spine, the soft tissues develop irritation or swollen that causes pain, restrictions on movements or muscle seizures. The physical therapy is aimed at those symptoms which are related to restrictive or unproductive movement and such physical deficit is associated with these movement disorders constrains body responsiveness and may frequently block one's ability to return to his or her previous level of performance [7].

The musculoskeletal system affects by many identical and consistent syndromes like both in the back and lower limbs and in the neck and upper limbs and after initial attack next episode is likely to becomes due and pain relapse with four and five times and individual tends to restrict activities and is at risk of becoming fractionally weaker and stiffer [1]. Lower lumber and mechanical pain often range from mild to severe and it can be felt repetitively or sporadically; this can regularly have observed in the industry even without the presence of any cogent anatomical causes and it can also be treated with non-surgical options to alleviate or by the management of pain. Describing of pain accurately by the blue-collar employee who experienced the pain and defining the area of pain distribution is important because it helps to determine the causes of pain. The exact diagnosis the low back pain rarely has significance to treatment, only in chronic and severe cases is further evaluation and diagnosis is helpful. Once the serious chronic back strains and sprains injuries medical conditions has been ruled out, non-surgical treatment options are best which includes but not limited to (a) short period of rest (b) Ice and/or heat application for activity related pain relief (c) Physical therapy and active exercise and stretching (d) Appropriate medications for pain relief [8].

The chronic back strains and sprains, however, impeded the ability to perform in the workplace as well as normal everyday activities. There are some common symptoms of the chronic back strains and sprains like muscle spasms either with activity, or at rest, pain that persists for a maximum of 12-14 weeks, incapability to maintain normal posture due to stiffness and/or pain, stiffness in the low back area, restricting range of motion and low back pain that may radiate into the buttocks, but does not affect the legs [8]. The diagnosis of chronic back strains and sprains is crucial when pain persists for more than three weeks and no improvement observed as expected.

Tests of X-ray to examine the structure of the vertebrae and joints and other potential causes like infections, fractures, and tumors and the Magnetic Resonance Imaging is also an option to test three-dimensional images of body structures; MRI can show the nerve roots, tissues conditions, spinal cord and other surrounding areas with enlargement, degeneration, and tumors [8].

Body postures and blue-collar employees in sugar factories

In accordance with the Bio psychosocial Model, we believe that "illness or health is the result of the interacting effects of a person's biology, psychology, and the social context in which he or she lives" [9]. However, sugar factories of this region have little or no concerns over the agronomical postures of their employees working in different sections and department. Therefore, a group of distinct chronic pain like back strains and sprains with other musculoskeletal disorders with different aetiologies factors have observed. Blue-collar workers are more prone to ill-health, musculoskeletal disorders and hypertension rates are high and severe. Results of different studies indicated that employee work for more than 95% of the working hours in sitting position are positively associated with neck pain and musculoskeletal disorder [10]. Neck flexion and neck pain are also positively correlated [11]. Neck and upper limbs musculoskeletal symptoms are also found significantly correlated with non-neutral postures like flexion and abduction of the shoulder. [12]. However, the only posture which increased the possibility of musculoskeletal disorder in blue collar employees found when the inner elbow angle was <121° [11]. This is also revealed in some studies that musculoskeletal symptoms found in hand and wrist extreme position as risk factor wrist extension of >20° increased the risk of carpal tunnel syndrome [13].

Risk of Musculoskeletal symptoms of the wrist and forearm also increased in blue collar employees with the repetitive work and extreme postures and thus perceived muscular tension is an early sign of musculoskeletal disorder that negatively affect the intrinsic motivation and employees are less likely to accept the challenging tasks and unwilling to perform such duties which requires exposures to certain postures [14] and there is a positive correlation between increased time spent sitting, physical inactivity and poorer back muscle endurance [15]. Whilst safety and the avoidance of accidents is heavily emphasized in physiotherapy education and some acceptance of risk, in the interest of the employee's happiness and fulfilment and may be difficult to accept. There are limited objective methods of measuring adherence to treatment regimens, measuring the circumference of a limb to gauge muscle bulk to measure joint range, could imply adherence to an exercise program. Adherence to prophylactic health advice is particularly low and in physiotherapy this will include postnatal exercises,

where measurement of adherence is particularly difficult as the consequences of non-adherence are not seen or experienced until later in life [16].

As it is evident from the fact narrated above that unfitting body postures sometimes seriously affects their motivations and willingness to perform such jobs again and negatively affect the process to support employee to achieve desired performance criteria, goals and task. We identified six variables to gauge level of intrinsic motivation with back strains and sprains and tested with the loss of supportiveness, sleeplessness, hopelessness and engagement efficacy [17]. People suffering from chronic back stress and strain pain develops sleeping problems, especially blue collars employees have weak flexors and extensors of back and these weak muscles generate aching pain at night (during sleeping). Continuous aching pain makes difficult for patient to take proper sleep and thus result in sleep deprivation and insufficient sleep extremely disturbs worker performance at work.

In consequence as depression proceeds it lowers the self-esteem of affected one due to continuous feeling of guilt because of low quality and quantity of work, inadequacy and ugliness cause them to lose their hope for advancement and promotions in their further career. A depressed and hopeless worker lives cloistered life and stops interaction with supportive individual and being isolated and introverted from close relation makes relationships fragile. Hence, affected one gradually lose his/her supportive relationships. Constant back pain, prolonged depression, deprivation of hope and wreck of the supportive relationships shatters workers interaction with meaningful social contacts.

The most important factor which affects the performance and motivation level of any person is fear of pain or relapse and if fear of pain continues it leads inexorably to pain-avoidance and thence to disuse with the threat of mechanical instability [4]. Management extroversive motivational practices for employees prone to musculoskeletal disorders are likely to make only a marginal difference on intrinsic motivation of blue collar employees unless individual factors decreased susceptibility on this occasion. We examined intrinsic motivation as the antecedence of back strains and sprains, engagement efficacy, fear of pain with loss of supportiveness, sleeplessness, hopelessness. Anecdotal evidences suggest a need to investigate the above descriptions, so we posited following hypotheses as shown in conceptual model (Figure 1).

Hypothesis 1: Musculoskeletal disorders and engagement efficacy in blue collar employees are negatively correlated.

Hypothesis 2: Musculoskeletal disorders are negatively correlated with intrinsic motivation.

Hypothesis 3: Engagement efficacy is significantly and positively correlated with intrinsic motivation.

METHODOLOGY

Subjects

With the prior approval of the management of the seven different sugar factories; survey questionnaire administered to their blue-collar employees. Initially 120 workers identified on random basis from each sugar factory. We have adopted straight forward approach to distribute and collect data; we guide participants to complete battery of questionnaire with their signature on informed consent form. Total participants of this study after removing and sorting out errors, anomalies and cleaning the data was (n=684) with overall response rate of 80.4% with mean age of 41.07 years (SD=8.87) and mean BMI 24.09 kg/m^2 (SD=3.31).

The subject population of blue-collar employees was manual workers and engaged in comparable type of work at the time of testing. A written informed consent with ethical approval was obtained. All subjects have different musculoskeletal disorders but majority has complaints of low backache and minor flexion injury to the lumbar spine due to flexion activities linked with postures related to their work since last 4 to 6 months and they engaged in similar type of work.

Further subjects with serious back pain resulting to trauma,

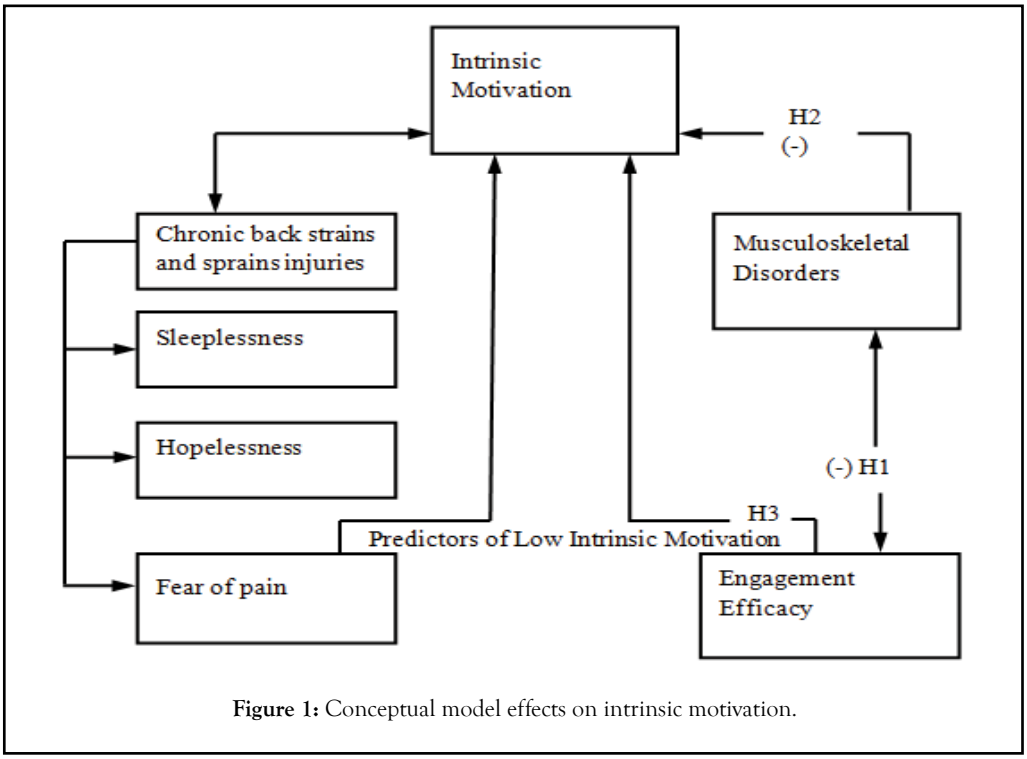

Figure 1: Conceptual model effects on intrinsic motivation.

patients of spinal surgery, radicular pain and pain ≥15 or 3/10 on a visual analogue scale and weekly sleep response rate ≥15 during testing were excluded.

The survey questionnaire containing 39 items in easy and understandable language known to participants and they were asked to rate using available survey scales. The items were equipoise for effects control and we grouped data into six factors i.e. Back strains and sprain (BSAS), Loss of supportiveness (LOSN), Sleeplessness (SLNS) and Hopelessness (HLNS) and gauged their influence on Intrinsic Motivation (INMO) Engagement Efficacy (ENEF). We also combined raw data of both survey questionnaires as the participation population scoring rate was identical on Likert scale ranging from Strongly Agree (5) to Strongly Disagree (1). We analyze factors to observe the outcome influence on intrinsic Motivation and engagement efficacy.

Measures

Back strains and sprains (musculoskeletal complaints): Lower back strains and sprains, shoulders and hands or wrists musculoskeletal complaints measured by SNMQ (Standardized Nordic Musculoskeletal Questionnaire) as this gauge has been widely used for evaluating musculoskeletal complaints [18]. In this questionnaire participants specified their answers concerning about pain or discomfort which prevented them from execution of their tasks and normal duties utilizing a 5-point Likert scale (1-Very rare to 5-Always). Participants have had musculoskeletal trouble with a particular area in their body in the past 3-4 months examined and analyzed with their performance assessment for intrinsic motivation and engagement efficacy mean scores. This variable has six items out of them two items taken from predictors of Back Strains and Sprains sub scale [19] and four items from the Social forces sub scale developed by Warren [20]. The reliability analysis yielded high alpha coefficient for the six items internal consistency (α=.863).

The loss of supportiveness: This variable contains items indicating loss of supportiveness as asked "I wanted/tried to be supportive of my Co-worker" and "I wanted/tried to be aware of the impact my behavior might have on my Co-worker's feelings". Since MSD pain and physical complaints compelled worker less supportive towards his/her coworker, therefore this variable measured by different items and the inter item reliability and internal consistency was found (α=.837).

Sleeplessness: Five items containing the physical conditions of blue collar employee who diagnosed with MSD in connection with sleeplessness like "I'm physically tired", "I had my sleep disrupted", "How comfortably did you sleep last night? [21]. The inter item reliability and internal consistency was found (α=.861).

Hopelessness: A five items scale measured HLNS. This scale included items to assess state of hopeless at workplace and with coworkers with the job, the likelihood that employee would advise coworkers for support in work and cooperation. The Cronbach alpha=0.861.

Engagement efficacy: This variable measured ENEF by five items included in the sub scale [22]. "How confident are you that you can meet deadlines in your work?" and "How confident are you that you can physically handle demands of your task?" inclusive of other items used to gauge and predict the engagement efficacy of subject employees. The reliability and internal consistency (alpha coefficient) was found (α=.840). The significance levels for analyses were set at the 0.05 level.

Analyses

The significant p level was below 0.05 and significance levels below 0.10 mentioned in the tables. The probability of back pain and strain is more likely to present in different chronological age to influence various symptoms like back pain; therefore, it was integrated in each model, irrespective of level of significance. The Pearson product-moment correlation coefficient was employed to gauge the association and hypotheses were tested by performing logistic regression analysis to analyze the intrinsic motivation level and musculoskeletal disorders.

The chi-square statistic was utilized in two-way tables to check the significance of the overall degree of association of intrinsic motivation level and musculoskeletal disorders. Descriptive statistics was obtained to measure the distinctive variables and difference between frequencies were examined with chi-square test to determine whether the data sets differ significantly, whilst difference between means were tested with the t statistic.

The odd ratios, confidence interval and p value were also obtained to observed the daunting prospect of independent and outcome variables to highlights the importance of critical evaluation of MSD association probability with intrinsic motivation and engagement efficacy.

RESULTS

The descriptive statics indicated that minimum service tenure was 7.3 years (M=2.78, SD=1.15), Marital status of the participants was (M=1.79, SD=.56) and chronological age was 41.07 (SD=8.87). The descriptive statistics of other focal demographics variables are shown in Tables 1-4. Means, standard deviations and correlations among the important variables displayed in Table 1.

The variables were significantly associated with each other as consistent with our hypotheses. Back strain and sprain (BSAS) and intrinsic motivations (INMO) was negatively correlated as (r=.-485); Similarly, Back strain and sprain (BSAS) and Engagement Efficacy (ENEF) were also negatively correlated as (r=.-541) and our final hypothesis Engagement efficacy is significantly and positively correlated with intrinsic motivation was also found consistent with the results as both were positively and significantly correlated as (r=.631) and thus our all hypotheses were statistically supported by utilizing Pearson product-moment correlation coefficients. As we presumed that controls were positive and no significant change by way of demographic diversities was observed.

Further to analyze the effect of low-back pain and sprain on the assessment of the physical movements factors was investigated for the effect of blue collar employees. The frequency, precision of pain was gauged by the endurance level to determine aetiology as a subject of investigations. The duration of sitting, standing and lifting were the exception to detect accurate conditions of intrinsic motivation among blue collar employees.

Table 3 showed the results of back sprain and strains (MSD) and endurance scores of the individual participants. Significant

Table 1: Mean SD and correlations.

	INMO	BSAS	LOSN	SLNS	HLNS	ENEF	Mean	SD
Intrinsic motivation	1	. -485**	.427**	.433**	.312**	.631**	2.466	1.3883
Back strains and sprains		1	.432**	.264**	.348**	. -541**	3.436	1.0814
Loss of supportiveness			1	.398**	.358**	.457**	3.194	1.2288
Sleeplessness				1	.304**	.457**	3.194	1.2831
Hopelessness					1	.337**	3.42	1.1522
Engagement efficacy						1	3.203	1.2358

**. Correlation is significant at the 0.05 level (2-tailed)

Table 2: Descriptive statistics.

	Frequency	Percent
Geographical area	-	-
1.0 Urban	288	42.1
2.0 Rural	396	57.9
Tenure in Job	-	-
Less than 3Y	103	15.1
3 to 7Y	203	29.7
8 to 14Y	146	21.3
15 to 22Y	200	29.2
23 and above	32	4.7
Age groups	-	-
20-27	60	8.8
28-35	117	17.1
36-42	85	12.4
43-48	219	32
49-55	193	28.2
56 and above	10	1.5

association did exist within participants between lower back pain and reduced engagement efficacy due to higher sitting, standing and lifting periods, r (.73)=.24, P=.06).

To test whether the significance of the overall degree of association of intrinsic motivation level and musculoskeletal disorders, we employed a $\chi 2$ test of independence and criterion of significance was α=0.05 and according to the $\chi 2$ test, the significant results yielded as $\chi 2$ (1, N=684)=5.81, p=009, therefore it is conveniently inferred that increased musculoskeletal disorder or back strain and sprain likely to reduce the intrinsic motivation and engagement efficacy. Statics of occurrence and endurance of MSD was also obtained to analyzed frequency and severity of pain in different postures as shown in Table 3. Shapiro-Wilk and Kolmogorov-Smirnov test was conducted to check the earlier and post data normality assumptions and extreme or high values.

Correlation was also observed between low back muscle endurance scores and low intrinsic motivation levels r (.57) p=.001). Results shows significant statistical difference in pre-test and post test data distributions. Questionnaire concerning different postures and activity willingness yielded slightly distinctive results as no significant difference was found in pre-test and post-test conditions (Table 3).

Table 3: MSD and endurance scores.

	Means of last 4 months	Means of last 6 months	SD
Slump (Lx)	147.18	151.18	2
Sit–slump (SS)	176.23	194.9	9.34
Sit (hip)	168.45	151.83	8.31
Sway (hip)	139.71	155.26	7.77
Sit (Lx)	193.22	184.13	4.55
Slump (hip)	179.9	189.8	4.95
Stand (Lx)	14.48	12.32	1.08
Sway (Lx)	118.77	106.09	6.34
Stand (hip)	138.21	108.9	14.66
Flexion (Lx)	208.34	267.12	29.39
Lift (Lx)	155.86	186.86	15.5
Flexion (hip)	111.45	107.73	1.86
Lift (hip)	103.04	87.81	7.62
Flexion (knee)	190.23	173.37	8.43
Lift (knee)	101.78	103.55	0.88
Endurance	188.45	118.12	35.17
Lx. Lumber:	Endurance seconds		

The odds ratio (exponentiated β) in a binary logistic regression with intrinsic motivation level as a continuous predictor was analysed and converting odds ratio to probability was reviewed. The odds incremental ratios, confidence intervals and p values obtained are shown in Table 4.

Table 4: Occurrence of back or neck pain in relation to intrinsic motivations' items.

Variable	95% CI	Odd ratios	P-value
Intrinsic motivation	1.62	0.80-1.14	0.124
Back strains and sprains	1.98	1.26-1.79	0.048
Loss of supportiveness	1.88	0.84-1.71	0.058
Sleeplessness	2.49	1.1-1.58	0.011
Hopelessness	1.71	0.88-1.17	0.52
Engagement efficacy	2.88	1.11-1.37	0.001

Results shown proportion differences for each variable set, we used a Results shown proportion differences for each variable set, we used a $\chi 2$ test of with alpha equal to .05 for significance and accordingly loss of support from co-workers and supervisor reduced (no=33.4) than was expected (no=50.1) because of back sprain and strain; Intrinsic motivation decreases (no=35.2) than was expected (no=61.3) due to musculoskeletal disorders; sleeplessness increases by (no=45.26) because of back strain and sprain than was expected (no=61.35); Hopelessness increases by (no=31.89) than was expected (no=45.41) because of prevalence of musculoskeletal disorders in the blue collar employees at workplace. test of with alpha equal to .05 for significance and accordingly loss of support from co-workers and supervisor reduced (no=33.4) than was expected (no=50.1) because of back sprain and strain; Intrinsic motivation decreases (no=35.2) than was expected (no=61.3) due to musculoskeletal disorders; sleeplessness increases by (no=45.26) because of back strain and sprain than was expected (no=61.35); Hopelessness increases by (no=31.89) than was expected (no=45.41) because of prevalence of musculoskeletal disorders in the blue collar employees at workplace.

Engagement efficacy of blue collar employees was reduced by (no=46.41) than was expected (no=62.41) as complaints of back strain and sprain increases with low endurance time and according to overall $\chi 2$ test of independence, such differences was statistically significant. The $\chi 2$ test yielded $\chi 2$ (480, N=684) =1509.33, p=.001.

Accordingly, we can infer that back sprain and strains (MSD) is significantly associated with the low intrinsic motivation, engagement efficacy, support from co-workers and supervisor, high sleeplessness and hopelessness in blue collar employees of sugar factories.

DISCUSSION

This study was designed to understand the link between low intrinsic motivation in blue collar employees and musculoskeletal disorders with other predictor variable in order to observe the effect. Therefore, this is the exclusive study that gauge the association between the prevalence of MSD (Back sprain and strain pain) intrinsic motivation and engagement efficacy. The analyses revealed relationships between several job motivation levels and back or neck pain. We utilized novel methods to analyze the constructs and this study postulates a significant and unique contribution to the current literature in this area.

We found very noticeable and significant evidence and trend for low intrinsic motivation association with low endurance of MSD. Our results suggested that high level of back sprain and strains (MSD) reduces the intrinsic motivation at the level of $n \geq 40$. The top performers with minimum endurance $\mu=138.21$ are more likely to prone with low engagement efficacy because of various variables like sleeplessness, hopelessness, loss of support from the supervisor and co-workers as all related to the prevalence of MSD.

The different mechanical and manual job of the blue-collar employees working in different section of the sugar mills are considered and recognized as mentally and psychologically very demanding [23]. Psychological and physiological working demands and physical postures were measured using the job index and content questionnaire in this study. These questionnaire 39 items originally developed and validated for comparisons between occupations [24] and we utilized it to compare between job contents and MSD endurance.

The physical conditions were homogeneous due to prevalence of back sprain and strain, the results interpreted with cautions and restraints applied. The cardinal findings of this study were that physical postures and endurance time among all blue-collar employees was remained strongly and significantly correlated with engagement efficacy and intrinsic motivations even after control for past and current weight, age, physical work load and body height (BMI). Our results also suggested that Loss of Supportiveness, Sleeplessness Hopelessness were also associated with low intrinsic motivations and engagement efficacy with constant prevalence of MSD in blue collar employees of the sugar factories. When back strain and sprain (MSD) prevail or increases, support from co-workers and supervisors decreases due to inability and unwillingness to execute challenging tasks. In many self-reports of physical postures were not related to any of the physical symptoms but rather the psychological work stressors and their resulting emotional strains [25]. However, the endurance time and job contents with frequency of occurrence determined the severity of problem and its repercussive outcomes.

Negative correlation found in musculoskeletal disorders and engagement efficacy in blue collar employees, when MSD increase the engagement efficacy decreases in proportionate mentioned above. The decrease was outlined as amount of deviation from a set standard of productivity. While the engagement efficacy is the ability to produce a desired or intended result by attaching connections and strong links with the organization and this attachment reduces or affected on the occurrence of back strain and sprain conditions which maintained negative correlations. Similarly, statistical analysis yielded significant results about negative association between musculoskeletal disorders and intrinsic motivation because low intrinsic motivation is likely to increase the depression among blue-collar employees and decreased or low intrinsic motivation and engagement efficacy were associated to several of the factors in the questionnaire.

Whereas engagement efficacy found to be significantly and positively correlated with intrinsic motivation as intrinsic motivation increases engagement efficacy increases in the same proportionate and level. While musculoskeletal disorders were conjoint, even at higher levels of persistence, there are likely to be several reasons why motivation influences were infrequently reported [26]. However, these results encompass previous studies on other illnesses, indicating analogous effects on productivity and motivations, due to conditions that are not severe enough to lead to lost work time [27-31].

CONCLUSION

The nature of this study was cross- sectional therefore only blue-collar employees of the sugar factories were examined controlling to a possible selection bias and the non-random selection of the participants may even expand such possibility. No causal and path relationship can be inferred despite strong statistical significance measured and causal interpretations of our current finding only speculative because variables and outcome variables were gauged at the same point. This study should adopt a longitudinal design

to better delineate the causal links between MSD, Back strain and sprain strain symptoms.

This study will enable management and supervisor to better tailor interventions aimed at minimizing engagement efficacy, low intrinsic motivation and overall work productivity costs. This study also opens the new research arena to combine social, behavioral and medical research relationship and to examine its possibilities and effectiveness. The previous studies restraint to psychosocial and psychological limits, while this research encourages to seek cause and path analysis between emotions and physiological symptoms, important for productivity.

LIMITATIONS

Blue-collar employees in sugar factories particularly in this region has diversified cultural and racial background and dissimilar in health and mental conditions therefore questionnaire was considered for this study to obtain information about their physical health and work postures over a range of different section and station of the factory, not just at work. We utilized validated items taken from different sources as referred but we were unable to locate exact items specific to requirement and concurred with this study. Therefore, results of this study cannot be generalized. Validity of self-reported questions may be raised as fear of loss of pay, job and title due to MSD conditions were always supposed to be in the mind of blue-collar employees of the sugar mills of this region. So, there was no mention in the study information to participants of the intention to study Intrinsic motivation and engagement efficacy criterion.

There may have been reluctance to report symptoms, reduced motivation and engagement due to fears that if the employer received the information, this might influence their career. However, we have strong reason to believe on the veracity of data because of the employees' unionized nature of employment.

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