

Ergonomics in Construction Industry

Kapil J. Bhadane¹ and Kavita G. Pawar²

Abstract: Construction industry in India has growing fast in last two decades. It is today's demand that infrastructure needs for improving economy. In India still 80% work has doing manually in construction sector. Work like continuously working in same motion, heavy lifting, working in difficult positions, climbing ladders, continuously goes upstairs and downstairs etc. While continue doing that type of work, pressure has comes on organs and workers human life has been destroy by musculoskeletal disorders. That type of workers healthy life is only around 40 years. That has happening not now; bur from when construction industry has been born.

Keywords: Ergonomics, Musculoskeletal Disorders, Construction.

1. INTRODUCTION

Construction sector is the largest contributor to central exchequer and it is the 2nd largest employer in the country. It creates more than 45 million jobs either directly or indirectly among various classes of individuals in the country. [1] Every construction work is unique and includes various activities which are depending on labor force. In India total 32% are labor and from that 30% are working on construction sites. [2] Work like continuously working in same motion, heavy lifting, working in difficult positions, climbing ladders, continuously goes upstairs and downstairs etc. While continue doing that type of work, pressure has comes on organs and workers human life has been destroy by musculoskeletal disorders (MCDs) and it is known as ergonomics illnesses or injuries. It does not include injuries caused by falls, slips, trips or other similar accidents. That type of workers healthy life is only around 40 years. So to improve that situation need to changes in work environment like working machinery or working instruments or additional safety equipment's or safety training, etc. The study of people's efficiency in their working environment is known as ergonomics. Something that is designed to work smoothly with the human body is designed to be ergonomic. [3] Another definition of ergonomics has been presented by OSHA(2011) is the science of fitting jobs to people encompassing the body of knowledge about physical abilities and limitations as well as other human characteristics that are relevant to job design. [4].

2. LITERATURE SURVEY:

Boatman et al. (2012) has been did the study related attitudes and awareness that contractors, unions and workers have about ergonomics and what its status is in practice. They did survey in many construction sites with questionnaire and discussed with those persons who was actually working and facing the muscles problem. Study has been showed that around 40% workers were unaware related that. [5]

Everett (1994) has been presented seven risk factors by overexertion injuries such as static exertion, Repetitive exertion, forceful exertion, posture stresses, vibration, low temperature and localized

¹ Department of Construction Management R.M.D.S.S.O.E., Warje,Pune, Maharashtra, India

² Department of Construction Management R.M.D.S.S.O.E., Warje,Pune, Maharashtra, India

mechanical stresses. Those factors have been rated by 1 to 3 such as 1 for insignificant, 2 for moderate and 3 for high. This analysis could be used where pre-planned and repetitive activity has been going on. For that we will be use automation and robotics to avoid over exertion. [6]

Devi and Kiran (2015) has been presented workers musculoskeletal disorders who were working in various industries like Gold Smith, Sewing Machine Operator, Printing press, Brick kilns, Super market cashiers, Taxi Drivers and Sanitation. Result was the problem of upper extremity which includes the problems of pain in neck, shoulders, wrist, elbow, back is 80,20,45,75% found to be is highest among the gold smith workers preceded by problem of upper extremity among the brick kilns workers is (73 %). The workers of sewing machine operators and newspaper printers have less level of discomfort as only 16, 41 present. [7]

Survey in Construction Industry

Survey in construction industry presents how much effect on each every body of workers. Table 1 shows the list of work and its probability of MCDs by conventional work process.

Table 1: Probability of MCDs

List of Works	Probability of MCDs
Excavation	0.70
Mortar Mixing or Concrete Mixing (Manually)	0.68
Formwork Making	0.75
Formwork Fixing	0.70
Concreting	0.67
Reinforcement Cutting and Bending	0.65
Reinforcement Shifting	0.65
Reinforcement Fixing	0.65
Brick Work	0.42
Brick Shifting	0.70
Plastering	0.62
Painting	0.57
Tile Laying	0.52
Electrical Work	0.35
Aluminum Window Work	0.55

Excavation will be done by manually operated JCBs gears and breaks, that's why pressures has comes on totally on hands and full back. If we will use touched screen buttons for that it will be positively affected. Many times concrete has been mixed by mixture but not mortar. If we could mix both in mixture rather than manually, it would be omit negative affect. While making conventional type formwork, we have been used hammer every time, if we use screwing machine rather than hammer, low pressure has comes on hand. Self-compacting concrete we will use for concreting, then all workers who was busy for spreading concrete get relaxed. Use machine for bending instead of bending manually. Light weight bricks as well as light weight tiles both can be used rather than heavy. This will affect both while construction and material shifting. For plastering and painting, use automated moving scaffold with proper platform and by we will did job by gunninting. Most problematic issue is material shifting, tower crane and belt conveyor can be used to material shifting. Table 2 shows improved probability of MCDs while applied as per said solutions.

Table 2: Improved probability

Sr. No.	List of Works	Probability of MCDs	Improved Probability in %
1	Excavation	0.50	28.6%
2	Mortar Mixing or Concrete Mixing (Manually)	0.23	66.2%
3	Formwork Making	0.62	17.3%
4	Formwork Fixing	0.60	14.3%
5	Concreting	0.17	74.6%
6	Reinforcement Cutting and Bending	0.33	49.2%
7	Reinforcement Shifting	0.32	50.8%
8	Brick Work	0.33	21.4%
9	Brick Shifting	0.37	47.1%
10	Plastering	0.50	19.4%
11	Painting	0.50	12.3%
12	Tile Laying	0.35	32.7%

3. CONCLUSION

Conventional construction work harms to workers life. There many current options available in market. We need to apply it. Then we can improve our workers life. There another factor affect for application of various advantageous machineries that is money. But prober management will do it better.

REFERENCES

- [1] N.S.D.C. and Government of India. "Human Resources and Skill Requirements in the Building Construction and Real Estate Sector". Volume 5. 2013-17 and 2017-22.
- [2] RatriParida and Pradip Kumar Ray. "Factors influencing construction ergonomic performance in India". ScienceDirect. AHFE. 2015. Page no. 6587 – 6592.
- [3] <https://www.vocabulary.com/dictionary/ergonomic>.
- [4] OSHA Field Safety and Health Manual. U.S Department of Labour. Directive Number: ADM 04-00-001. Effective Date: May 23, 2011.
- [5] Laura Boatman, Debra Chaplan, Suzanne Teran. "Creating the Climate for Making Ergonomic Changes". State Building and Construction Trades Council of California. May 2012.
- [6] John G. Everett. "Ergonomics, Health, and Safety in Construction: Opportunities for Automation and Robotics". Elsevier Science. 1994. Page no. 19 to 26.
- [7] Kalpana devi & U.V.Kiran. "Work Related Musculoskeletal Disorders among Workers In Unorganized Sector". International Journal of Technical Research and Applications. Volume 3, Issue 3 (May-June 2015), PP. 225-229