

Conference Paper

The Levels of Physical Activity and Work Experience Among Construction Workers: A Preliminary Study

Siti Ainun Marufa*, Firza Nadia Putri, Ega Halima Ramdini, Nurul Aini Rahmawati and Kurnia Putri Utami

Physical Therapy Department, Faculty of Health Science, University of Muhammadiyah Malang

ORCID

Siti Ainun Marufa: <https://orcid.org/0000-0002-7001-346X>

Abstract.

Injuries and health problems related to musculoskeletal disorders are common among construction workers. Physically active people have good postural stability which is correlated with less injuries. The purpose of this study was to measure the level of physical activity against work experience in construction workers. 36 healthy men aged 20-60 years were divided into two groups based on their work experience: less experience (LE, n = 12), and more experience (ME, n = 24). Physical activity at work, through sports, and associated with leisure were assessed using the Baecke questionnaire. The results found that there was no significant difference between the LE and ME groups in the level of physical activity ($p = 0.146$ for work, $p = 0.515$ for sport, and $p = 0.821$ for leisure). Nevertheless, both the LE and ME groups had a higher level of physical activity at work than at sport and leisure ($p < 0.0001$). This preliminary study indicated that construction workers have a high workload which impedes them from other activities during leisure time. Further studies are needed to investigate the correlation between the physical activity level and postural stability among construction workers.

Keywords: physical activity, construction workers, work experience

1. Introduction

In the industrialized country, fall at the workplace is the biggest cause of occupational injury [1]. The environment including the floor, lighting, and weather as well as specific task such as the speed, and force, also person's characteristic including age, sex, and sensor-motor system plays an important role behind the risk of falling [2, 3]. Task among construction workers such as building, disassembling, and modifying at certain altitudes and the terrain is considered to be risky [4]. In any conditions, construction workers are required to be a struggle and strong physically also mentally [5]. Less postural stability leads to accidents during work among height workers. Further, muscle imbalance, bone fracture, bruises wound, and death are the impact of less postural stability [6].

Corresponding Author: Siti Ainun Marufa; email: ainunmahruf@umm.ac.id

Published 15 September 2022

Publishing services provided by
Knowledge E

© Siti Ainun Marufa et al. This article is distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use and redistribution provided that the original author and source are credited.

Selection and Peer-review under the responsibility of the ICMEDH Conference Committee.

OPEN ACCESS

Work in construction is categorized as having high occupational demands [1]. Injury and any health problems related to musculoskeletal disorders are common among construction workers due to substantial problems during work [7]. In Europe, construction workers have to pass several tests such as neurological, visuality, and oropharynx. The assessment of postural stability is important as well, to prevent fall occurrence during work. In maintaining the control of postural and stability, the capacity of neuromuscular, sensory, and motoric function, as well as neuromuscular coordination are important to prevent the injury [8]. Muscle strength and balance are intrinsic factors to lead fall risk and accident generally [9].

Controlling potential reflex minimally possible leads to effectivity in balance. Standing on an uneven base, or at a certain height, or test among the elderly can be used to observe a person's balance [10]. People who maintain their body upright will affect the control of body position. Controlling body posture can be improved by the activity of neuromuscular, such as lower limb muscle and ankle stiffening [11]. The change of postural stability which is correlated to balance level is influenced by the physiological condition and the anxiety state [11]. Among the construction workers, work experience influences postural stability. Fewer experience workers have less postural stability [12]. Moreover, a transition from sitting to standing can be easily done by among-experienced workers [13]. Other, workplace and position change influence postural stability in standing.

Unfortunately, the world is currently facing a pandemic situation due to severe acute respiratory syndrome coronavirus (SARS-Covid-2) in the early of 2020 become a global emergency [14]. To prevent the spreading of the virus, some countries underwent lockdown in restricting the voyage. The enactment of the policy requires citizens to limit their activity outside the home. During the physical distancing are enforced, most people experience sudden stress caused by prolonged staying at home [15]. Many jobs are affected, and so people are working from home. However, not every work can be completed from home, as an example is construction workers. This situation may affect the change of employee's health including lifestyle and may lead to inactivity also sedentary behavior [16, 17]. The purpose of this preliminary study was to assess the level of physical activity against work experience in construction workers during the pandemic situation.

2. Methodology

2.1. Participants and group dividing

The participant's criteria in this study were as follows: aged between 20-60 years old, minimally has one year experience as a construction worker, able to communicate, willing to be a participant, no health issues both physically and mentally [2]. We recruited 36 healthy male construction workers and divided them into two groups. The first group is less experience (LE) (n=12) and the second group is more experience (ME) (n=24). All participants were given a sheet of informed consent.

2.2. Research methods

To measure the level of physical activity at work, sport, and leisure time, we used the Baecke questionnaire [2]. This is a valid and reliable questionnaire to measure physical activity levels [18]. This questionnaire has three different indexes, each index has three interpretations including low, medium, and high in level. The results are adjusted to the participant's answer regarding the duration and intensity of physical activity.

2.3. Statistical methods

All statistical analyses were using SPSS version 17.0 (SPSS, Chicago, IL, USA) with a p-value < 0.05 considered significant. The average and standard error of the mean (SEM) are present in all data. An independent t-test was used to analyze differences between groups (LE and ME groups). The differences between physical activity levels at work, sport, and leisure in groups were measured as well using an independent t-test. A one-way analysis of variance (ANOVA) was used to analyze the physical level at any activities [at work, at sport, and at leisure] in each group.

3. Results

Figure 1 shows there was no significant difference in the physical activity level between LE and ME groups. An unpaired t-test confirmed that the physical activity level among the groups was not significant ($p = 0.146$ at work, $p = 0.515$ at sport, and at leisure $p = 0.821$). Figure 2 shows there were significant differences among physical activity levels in the LE group. A one-way ANOVA confirmed the difference between physical activity at sport and at leisure compared to at work with the factor group ($F_{2,33} = 32.39$, $p <$

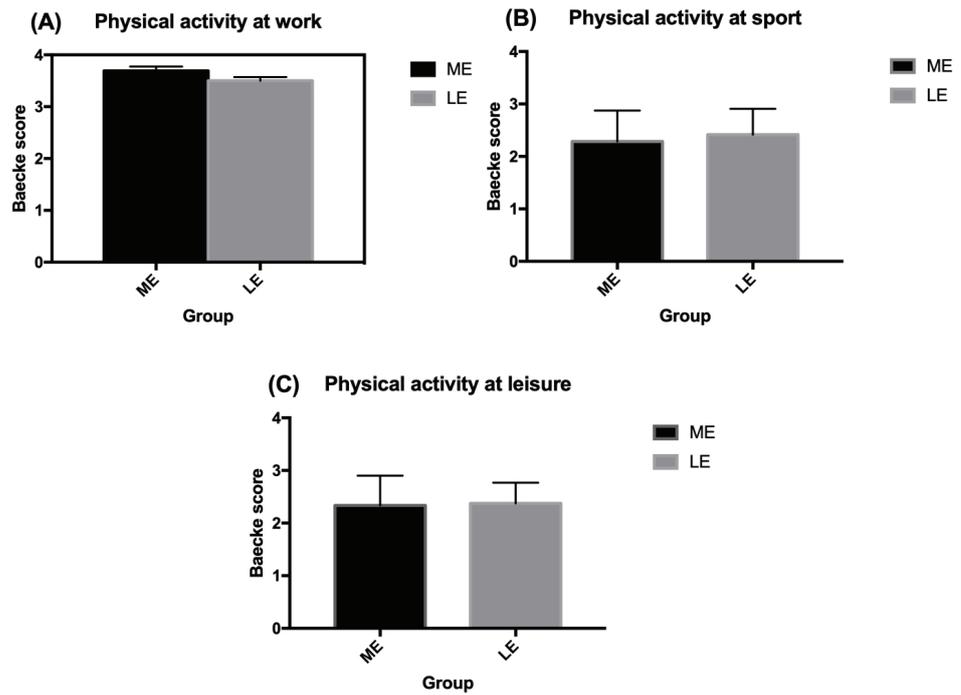


Figure 1: The comparison of physical activity level between groups. The level of physical activity during work (A), during sport (B), and during leisure time (C). *ME: more experience group *LE: less experience group.

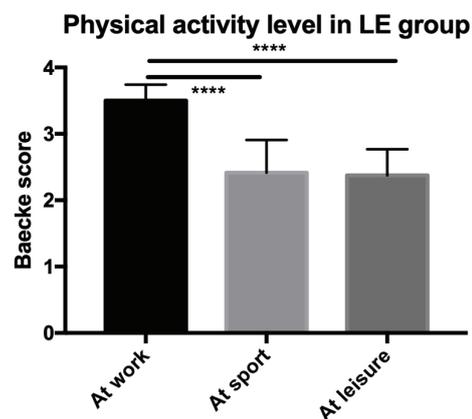


Figure 2: The comparison of physical level in LE group at any activities. **** $p < 0.0001$, by one-way ANOVA on the physical activity level each activities compared to activity at work.

0.0001). Figure 3 shows ME group was significantly different in physical activity at sport and leisure compared to at work ($F_{2,69} = 54.78, p < 0.0001$).

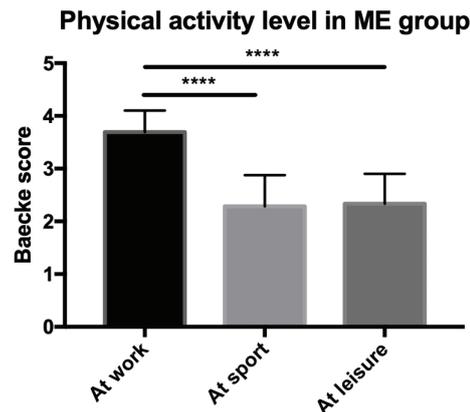


Figure 3: The comparison of physical level in ME group at any activities. **** $p < 0.0001$, by one-way ANOVA on the physical activity level each activities compared to activity at work.

4. Discussion

The assessed results of physical activity level from the Baecke questionnaire can be used to identify the highest and lowest activity at work, at sport, and leisure [18]. Both LE and ME groups have no difference in the average physical activity at work, at sport, and at leisure. These results represent that physical activity among construction workers was the same, working experience may not affect the level of physical activity. The reduced physical activity at sport and leisure are caused by the increase in physical activity at work. The previous study in the opposite situation reported that a lower level of physical activity at work among the office workers showed increased activity at sport and at leisure time [19]. During their free time, they take the time in exercising regularly [20].

In the UK, there was one that studies proved among construction workers, have a poor work-life balance [21]. This condition has happened in developed countries as well. Nevertheless, such as competition in the construction industry, the regulation to work is indeed not in line with the principles of humanity. Work in longer hours, inflexible duration of work, high-tasks such as climbing up the stair, carried weight thing, and long-standing duration is the example who underlined the poor work-life balance [22]. In Australia, the average of a site-based employee was 63 hrs, while site office was 56 hrs, and full-time workers from another field were 44 hrs per week [23].

Moreover, higher physical activity levels at work among all construction workers can train the particular muscle groups and may affect the increase of postural stability [24]. One study reported the height construction worker has a higher physical activity level at work compared to office workers. In addition, postural stability has a higher result as well compared to the office worker [2]. They revealed, higher physical activity such

as the occupational task and balance training indirectly related to the nature of this work may affect the result of postural stability. Another condition showed the same high physical activity level between construction workers and firefighters have the different result of postural stability which construction workers are leading [25]. Nonetheless, both construction workers and firefighters have higher physical activity levels compared to nursing staff.

In another study, the elder construction worker with long experience work has good postural stability compared to a novice [12]. During work at a height place without any handrail, their postural stability suddenly decreased, and some experienced cardiovascular stress. The workplace and the experience among workers correlate with postural stability despite age [2]. On the other hand, good postural control correlated to increased posture risk, for instance, the change of workplace height. The greater postural control can be found in young healthy adults [26].

We acknowledged some limitations, the participant size of each group was small, which may offer less statistical analysis. Another limitation is we analyzed physical activity level only in this preliminary study, we have to conduct further study to correlate the phenomena we found with postural stability score and any other problems related to the construction industry.

5. Conclusions

In the present study, we analyzed the physical activity level among construction workers at work, at sport, and at leisure time. The results showed no difference between the group we divided, both less and more experienced workers have the same high physical activity at work. The physical activity at work in each group was also significantly higher compared to physical activity during sport and leisure time. The physical activity level data in this study can be considered to measure postural stability and fall risk as well among construction workers. To improve our findings, larger sample size is needed to be implemented in further study. The analysis will not be focusing on physical activity only, yet stability and problems need to be assessed.

acknowledgments:

The authors would like to acknowledge all teachers and laboratorians in physical therapy department for supporting us during the process of taking the data.

Conflict of Interest:

The authors have no conflicts of interest to disclose.

References

- [1] Latza U, Karmaus W, Stürmer T, Steiner M, Neth A, Rehder U. Cohort study of occupational risk factors of low back pain in construction workers. *Occup Environ Med*. 2000 Jan;57(1):28–34.
- [2] Cyma M, Marciniak K, Tomczak M, Stemplewski R. Postural stability and physical activity of workers working at height. *Am J Men Health*. 2018 Jul;12(4):1068–73.
- [3] Faude O, Donath L, Bopp M, Hofmann S, Erlacher D, Zahner L. Neuromuscular training in construction workers: A longitudinal controlled pilot study. *Int Arch Occup Environ Health*. 2015 Aug;88(6):697–705.
- [4] Mousavi SY. Sustainable high-rise building (Case study: Three example of sustainable high-rise building in Iran). *Journal of Basic and Applied Research International*. 2015;9(11):2027–33.
- [5] Salassa JR, Zapala DA. Love and fear of heights: the pathophysiology and psychology of height imbalance. *Wilderness Environ Med*. 2009;20(4):378–82.
- [6] Schenk P, Klipstein A, Spillmann S, Strøyer J, Laubli T. The role of back muscle endurance, maximum force, balance and trunk rotation control regarding lifting capacity. *Eur J Appl Physiol*. 2006 Jan;96(2):146–56.
- [7] da Costa BR, Vieira ER. Risk factors for work-related musculoskeletal disorders: A systematic review of recent longitudinal studies. *Am J Ind Med*. 2010 Mar;53(3):285–323.
- [8] Granacher U, Muehlbauer T, Zahner L, Gollhofer A, Kressig RW. Comparison of traditional and recent approaches in the promotion of balance and strength in older adults. *Sports Med*. 2011 May;41(5):377–400.
- [9] Gillespie LD, Robertson MC, Gillespie WJ, Sherrington C, Gates S, Clemson LM, et al. Interventions for preventing falls in older people living in the community. *Cochrane Database Syst Rev*. 2012 Sep;(9):CD007146.
- [10] Davis JR, Campbell AD, Adkin AL, Carpenter MG. The relationship between fear of falling and human postural control. *Gait Posture*. 2009 Feb;29(2):275–9.
- [11] Carpenter MG, Adkin AL, Brawley LR, Frank JS. Postural, physiological and psychological reactions to challenging balance: does age make a difference? *Age Ageing*. 2006 May;35(3):298–303.

- [12] Min SN, Kim JY, Parnianpour M. The effects of safety handrails and the heights of scaffolds on the subjective and objective evaluation of postural stability and cardiovascular stress in novice and expert construction workers. *Appl Ergon*. 2012 May;43(3):574–81.
- [13] DiDomenico A, McGorry RW, Huang YH, Blair MF. Perceptions of postural stability after transitioning to standing among construction workers. *Saf Sci*. 2010;48(2):166–72.
- [14] Castañeda-Babarro A, Arbillaga-Etxarri A, Gutiérrez-Santamaría B, Coca A. Physical Activity Change during COVID-19 Confinement. *Int J Environ Res Public Health*. 2020 Sep;17(18):6878.
- [15] Yanovski JA, Yanovski SZ, Sovik KN, Nguyen TT, O’Neil PM, Sebring NG. A prospective study of holiday weight gain. *N Engl J Med*. 2000 Mar;342(12):861–7.
- [16] Altena E, Baglioni C, Espie CA, Ellis J, Gavriloff D, Holzinger B, et al. Dealing with sleep problems during home confinement due to the COVID-19 outbreak: practical recommendations from a task force of the European CBT-I Academy. *J Sleep Res*. 2020 Aug;29(4):13052.
- [17] Jiménez-Pavón D, Carbonell-Baeza A, Lavie CJ. Physical exercise as therapy to fight against the mental and physical consequences of COVID-19 quarantine: Special focus in older people. *Prog Cardiovasc Dis*. 2020 May - Jun;63(3):386–8.
- [18] Baecke JA, Burema J, Frijters JE. A short questionnaire for the measurement of habitual physical activity in epidemiological studies. *Am J Clin Nutr*. 1982 Nov;36(5):936–42.
- [19] Chau JY, van der Ploeg HP, Merom D, Chey T, Bauman AE. Cross-sectional associations between occupational and leisure-time sitting, physical activity and obesity in working adults. *Prev Med*. 2012 Mar-Apr;54(3-4):195–200.
- [20] Clemes SA, O’Connell SE, Edwardson CL. Office workers’ objectively measured sedentary behavior and physical activity during and outside working hours. *J Occup Environ Med*. 2014 Mar;56(3):298–303.
- [21] Sang K, Ison S, Dainty A. The job satisfaction of UK architects and relationships with work-life balance and turnover intentions. *Eng Construct Architect Manag*. 2009;16(3):288–300.
- [22] Holden S, Sunindijo RY. Technology, long work hours, and stress worsen work-life balance in the construction industry. *International Journal of Integrated Engineering*. 2018;10(2). <https://doi.org/10.30880/ijie.2018.10.02.003>
- [23] Lingard H, Francis V. The work-life experiences of office and site-based employees in the Australian construction industry. *Construct Manag Econ*. 2004;22(9):991–1002.

- [24] Gatti UC, Schneider S, Migliaccio GC. Physiological condition monitoring of construction workers. *Autom Construct*. 2014;44:227–33.
- [25] Punakallio A. Balance abilities of different-aged workers in physically demanding jobs. *J Occup Rehabil*. 2003 Mar;13(1):33–43.
- [26] Adkin AL, Frank JS, Carpenter MG, Peysar GW. Postural control is scaled to level of postural threat. *Gait Posture*. 2000 Oct;12(2):87–93.