RESEARCH ARTICLE

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Impact of Prolonged Standing on Activity Limitation and Participatory Restriction Among Security Guards: An Observational Study

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Abstract

Prolonged standing at work, lower extremity discomfort as well as the eventual development of Musculoskeletal Disorders (MSD) is particularly pronounced among security guards, whose job demands extended periods of standing, significantly impacting their personal and social lives. This issue can be addressed using the International Classification of Functioning (ICF) which serves as a comprehensive framework for understanding an individual's functioning profile, essential for discerning their specific needs. Hence, this study aimed to examine the impact of prolonged standing on the activity limitations and participation restrictions experienced by security guards, utilising the ICF qualifiers, SF- 36 and Lower Extremity Functional Scale (LEFS) as a functional assessment tool. A total of 260 individuals residing in Belagavi city, Karnataka, India, aged between 25 and 65 years, employed as security guards for more than two years and engaged in standing duties for at least 4 to 8 hours per day were examined for their activity limitations and participation restrictions were conducted using ICF qualifiers, SF-36 and the LEFS. The activity limitation and participation restriction studies use frequency distribution of the ICF codes. Karls Pearsons Coefficient was used to assess the correlation between SF-36 and LEFS. The results revealed that as per the ICF questionnaire, the majority of the participants exhibited mild to moderate difficulty in performing various tasks, including squatting, kneeling, standing, moving objects with lower extremities, running and jumping (coded as d4101, d4102, d4104, d435, d4552 and d4553, respectively). Upon correlating the scores from the LEFS with each component of the SF36 questionnaire, a significant positive correlation was observed with $p<0.05$. In conclusion, the demanding nature of security work, characterised by prolonged standing, contributes to activity limitations and participation restrictions among security personnel. Additionally, the detailed questions provided in the ICF documentation form facilitate a thorough assessment of activity limitations and participation restrictions among security guards, making it a preferred tool for such evaluations.

Keywords: Activities of Daily Living, Community Participation, ICF, Musculoskeletal Pain, Quality of Life.

1. Introduction

With the rise in crime rates and violence in society, the demand for security guards has surged in recent years. Safety and security are two of the most critical considerations. Security guards are responsible for monitoring, guiding and maintaining facilities (such as colleges, hospitals, IT businesses, banks and sports stadiums) as well as preventing and protecting individuals from crimes and risks. Security guards often experience MSD which develops gradually due to prolonged periods of standing in uncomfortable positions. Given that

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security guards predominantly maintain a static standing posture for extended durations, MSDs can progressively manifest and significantly affect their personal and social well-being over time. MSD is also the primary cause of the rise in absenteeism rates. MSDs are inflammatory and degenerative ailments that affect joints, muscles, peripheral nerves, tendons and supporting systems, among other things. As it affects several joints, it produces weariness, future pain and physical handicaps as well as increased work constraints, absenteeism and a transition to other jobs[1].

In epidemiological investigations, extended periods of standing during occupational tasks have been linked to discomfort in the lower extremities, varicose veins and other complications in pregnancy. It has also been linked to foot pain, a lower pain-pressure threshold throughout the workday and alterations in blood pressure regulations in workplace ergonomic studies. Prolonged standing has been proven to cause oedema and discomfort in the Lower Extremities (LE)[2]. Lower limb discomfort has been linked to several physical risk factors, including heavy pushing or pulling, standing and regular lifting as well as psychosocial issues[3]. People with jobs that require standing for long durations were suggested to commonly have Plantar Fasciitis, a common condition that causes plantar heel pain[4,5]. It is caused by localised inflammation of the plantar aponeurosis, which results in a tender and painful medial tubercle of the calcaneum[5]. Its frequency was found to be higher in security forces personnel[4]. Lower back pain was found to be a common work-related musculoskeletal problem among security guards which is mainly because of prolonged standing which results in poor quality of life. The World Health Organisation (WHO) defines quality of life as "Individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns"[6]. Occupational stress was found to be more common among security workers due to their low salary and long working hours which may have psychological effects leading to a decrease in the quality of life[7].

According to the WHO, the ICF is a system for categorising health and health-related domains. The ICF is acknowledged as a core component within the WHO's suite of International Statistical Classifications for Diseases and Related Health Issues (ICD). It serves as a foundational framework and classification system utilised for evaluating or measuring an individual's functioning. As per the ICF framework, activity limitation refers to challenges that individuals may encounter in carrying out specific tasks, while participation restriction denotes difficulties they may face in engaging fully in various aspects of life situations.

The literature on the effects of prolonged standing and QOL in security workers using ICF being insufficient, this study was intended to know the impact of long-standing on activity limitation and participatory restriction in security workers.

2. Methods

2.1 Study Design, Setting and Ethical Consideration

The current study was a cross-sectional observational study done on private security guards in Belgavi city. Ethical clearance was obtained from the institutional ethical committee before the commencement of the study. The safety as per guidelines of the Indian Council of Medical Research was followed throughout the interview given the current pandemic. All safety precautions were taken as per ICMR guidelines in light of the current pandemic.

2.2 Study Participants

The sample size calculated was 260 using the formula $n=(N\cdot z^2\cdot p\cdot(1-p))/(e^2+z^2\cdot p\cdot(1-p))$. People within the age group of 25-65 years with work experience as security guards for more than 2 years and working hours of at least 4-8 hours of standing were the inclusion criteria. People with any previous injuries or surgeries of the lower limb in the past 6 months were the exclusion criteria.

Using a non-probability sampling design, 260 participants were included. The purpose of the study was explained in the vernacular language and written informed consent was obtained from all the participants. All participants were screened based on the inclusion and exclusion criteria before their enrolment into the study. A brief demographic data was obtained from the participants prior to administering the scales.

2.3 Outcome measures

The outcomes were assessed using the ICF documentation form, SF-36 and Lower Extremity Functional Scale (LEFS). The ICF documentation form is a framework for describing and organising information on functioning

and disability. 21 codes from 3 domains of the ICF were chosen to study the activity limitation and participation restriction among security guards. SF- 36 is a questionnaire with 36 items about 8 multi-item variables. The LEFS is a questionnaire of 20 questions about a person's ability to perform daily tasks. All the questionnaires were explained to the participants in their local language. The data was co-related at the end. Privacy and confidentiality were maintained throughout the study.

Table 1. Profile of patients

Profile	No. of Patients	% of Patients
Age Groups		
21-30 years	41	15.77
31-40 years	83	31.92
41-50 years	61	23.46
>=51years	75	28.85
Mean	42.55	
SD	11.01	
Gender		
Male	204	78.46
Female	56	21.54
Experience		
1-5 years	103	39.62
6-10 years	122	46.92
>=11 years	35	13.46
Mean	7.08	
SD	4.17	
BMI		
UW	6	2.31
Normal	140	53.85
OW	109	41.92
Obese 1	5	1.92
Mean	23.94	
SD	2.98	
Total	260	100.00

3. Results

Statistical analysis was done using IBM SPSS version 29. The correlation between LEFS and SF 36 was done by Karl Pearson's coefficient. The activity limitation and participation restriction studies using frequency distribution of the ICF codes. The mean age of the participants was 42.55 ±,11.01, out of which 204 participants were male and 56 were female. The mean age for work experience was 7.08 ± 4.17. The mean BMI of 260 participants was 23.94 ± 2.98. (Table 1).

Among 260 participants, the minimum score for LEFS was 51.20 and the maximum score was 98.80 out of 100 with a mean of 82.4 ±11.88. SF 36 scale was used to find the QOL among security guards. It was found that QOL was hampered in security workers (Table 2).

3.1 Correlation Analysis.

The correlation between LEFS and SF 36 was done by Karl Pearson's coefficient.

When correlating LEFS scores with each component of SF 36, the parameters were found to be positive and statistically significant. (Table 3).

Activity limitation and participatory restriction were assessed using the ICF documentation form. Most of the participants experienced mild to moderate difficulty

Table 2. Summary of LEFS and SF-36 parameters

Variables	n	Minimum	Maximum	Mean	Median	SD
LEFS	260	51.20	98.80	82.41	85.00	11.88
Physical Functioning	260	35.00	100.00	79.20	85.00	14.66
Role limitations due to physical health.	260	0.00	100.00	65.87	75.00	27.42
Role limitations due to emotional problems.	260	0.00	100.00	63.40	66.70	25.11
Energy/Fatigue	260	15.00	85.00	61.12	60.00	13.44
Emotional Well Being	260	35.00	96.00	62.74	60.00	12.49
Social Functioning	260	25.00	90.00	60.60	62.50	13.95
Pain	260	32.50	100.00	70.42	77.50	17.66
General Health	260	25.00	80.00	54.47	50.00	14.71
Health Change	260	25.00	100.00	45.25	50.00	13.87

Table 3. Correlation between LEFS with SF-36 parameters by Karl Pearson's correlation coefficient

SF-36	Correlation between LEFS with		
	r-value	t-value	p-value
Physical Functioning	0.8823	30.1037	0.0001*
Role limitations due to physical health.	0.8363	24.4991	0.0001*
Role limitations due to emotional problems.	0.6598	14.1017	0.0001*
Energy/Fatigue	0.7839	20.2797	0.0001*
Emotional Well Being	0.7443	17.9008	0.0001*
Social Functioning	0.7703	19.4031	0.0001*
Pain	0.8208	23.0776	0.0001*
General Health	0.7171	16.5272	0.0001*
Health Change	0.5268	9.9552	0.0001*

*p<0.05

Table 4. Frequency distribution of ICF codes related to performance

Performance	Code 0	%	Code 1	%	Code 2	%	Code 3	%
d230	144	55.38	115	44.23	1	0.38	0	0.00
d240	27	10.38	131	50.38	100	38.46	2	0.77
d410	142	54.62	106	40.77	12	4.62	0	0.00
d4101	50	19.23	101	38.85	96	36.92	13	5.00
d4102	48	18.46	102	39.23	88	33.85	22	8.46
d4103	179	68.85	79	30.38	2	0.77	0	0.00
d4104	103	39.62	120	46.15	37	14.23	0	0.00
d4105	63	24.23	95	36.54	96	36.92	6	2.31
d415	137	52.69	117	45.00	6	2.31	0	0.00
d4200	134	51.54	100	38.46	26	10.00	0	0.00
d430	78	30.00	95	36.54	85	32.69	2	0.77
d435	40	15.38	111	42.69	101	38.85	8	3.08
d450	111	42.69	146	56.15	3	1.15	0	0.00
d4552	72	27.69	108	41.54	80	30.77	0	0.00
d4553	51	19.62	78	30.00	100	38.46	31	11.92

on the ICF Qualifier in the performance of squatting (d4101), kneeling (d4102), standing (4104), moving objects with lower extremities (d435), running (d4552), jumping (d4553) (Table 4).

4. Discussion

The present study was done to assess the effect of prolonged standing on activity limitation and participatory restriction among security guards using ICF. Along with ICF, SF 36 and LEFS were used to understand the quality of life among security guards.

M. Kristen Peek *et al.*, conducted a study on the reliability and validity of SF-36 in older Mexican Americans on 800 respondents who had a mean age of 70 years, which proved to be of utmost importance and great relevance. SF-36 gives a clear picture of the QOL in the set population[8]. The study conducted by K. Messing *et al.* concluded that prolonged standing is associated with increased LE pain symptoms. Similarly, this study was conducted to analyse the effect of prolonged standing among security guards using ICF and found that security guards were facing mild to moderate difficulty in activities and participation[2]. A study was conducted by Mansi

Manoj Mulye *et al.,* among security guards to find out the association between mechanical low back pain and the quality of life which concluded that low back pain is a major work-related MSD contributing to poor quality of life. Similarly in this study squatting, kneeling, standing, moving objects with LE, running and jumping were the affected domains leading to reduced quality of life[6].

As per the conducted by Tian-Shin Yeh *et al.,* on the responsiveness of SF 36 and LEFS for assessing outcomes in traumatic injuries of the lower limb extremities concluded that there is a high correlation coefficient between the physical component score of SF36 with LEFS but not with the mental component score (mostly higher than 0.8). In this study, all the parameters of SF 36 with LEFS were found to be positive and statistically significant[9].

According to the study conducted on the "Limitations of Long-Standing Non-Malignant Pain in Functioning, Activity and Quality of Life: A Gender Comparison", when item variables like lifting, carrying things, endurance, keeping posture, muscle strength, leisure time, sleeping and energy were assessed with ICF qualifier, it was observed that there was a major or total limitation due to pain. In this study, it was found that 31.92% of participants had mild pain and 31.92% had moderate pain. Similarly squatting, kneeling, standing, moving objects with LE, running and jumping were causing mild to moderate difficulty[10].

Among all the ICF codes (d240) carrying out a daily routine, (d410) changing basic body position, (d4103) sitting, (d415) maintaining a body position, (d4200) transferring oneself while sitting (e150), the environmental factors were the least affected.

5. Conclusion

The study concluded that prolonged standing leads to several activity limitations and participatory restrictions in security guards.

ICF and LEFS were found to be equivalent in measuring activity limitation and participatory restrictions among security guards.

A positive and highly statistically significant correlation was observed between components of SF 36 and LEFS with a p-value of less than 0.05. The present study concluded that LEFS can be correlated with the SF -36 questionnaire but the ICF questionnaire had detailed questions for assessing activity limitations and participation restrictions in security guards.

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