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Assessment of Work-Related Postural Risk Among Security Guards Using the Rapid Entire Body Assessment (REBA) Method: An Observational Study

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Abstract

Background: Security guards usually work for long hours, often standing or sitting without changing their posture. Staying in the same position for too long can cause tiredness, muscle pain, and long-term musculoskeletal problems. The Rapid Entire Body Assessment (REBA) scale helps identify how harmful a person's working posture is and whether they are at risk of developing Musculoskeletal Disorders (MSDs). **Objective:** To assess the posture of security guards during their working hours and identify their level of risk for musculoskeletal problems using the REBA method. **Materials and Methods:** This observational study included 100 security guards from different areas of Bengaluru. A questionnaire was used to collect details about their age, work type, daily working hours, and any discomfort they experienced. Their working posture was then evaluated using the REBA scale. Data were analysed using descriptive statistics, likelihood ratio tests, and Pearson correlation. A p-value < 0.05 was considered significant. **Results:** Out of 100 guards, 72 percent were in the medium-risk category, 20 percent were in the high-risk category, and only 8 percent were in the low-risk category according to REBA scoring. A large number of guards (86%) reported discomfort during work, mainly in the lower back and legs/feet. Age, height, and weight showed a positive correlation with the REBA score, meaning these factors increased the risk of poor posture. **Conclusion:** Most security guards are at medium to high risk for developing musculoskeletal problems due to standing or sitting for long hours without changing posture. There is also a lack of ergonomic awareness and training. Providing posture education, regular breaks, better workplace ergonomics, and routine assessments can help reduce this risk.

Major Findings: 72% of security guards were classified under medium ergonomic risk and 20% under high risk using REBA. 86% reported musculoskeletal discomfort, mainly affecting the lower back and lower limbs.

Keywords: Ergonomics, Musculoskeletal Disorders, Posture, Rapid Entire Body Assessment, Security Guards

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1. Introduction

Security guards play an important role in maintaining safety and security in workplaces, educational institutions, hospitals, residential areas, and commercial buildings. Their job often requires them to remain alert for long hours while standing, sitting, or walking continuously within a limited area. Unlike many other professions, security guards usually have very little flexibility to change their posture during duty hours. This makes them more vulnerable to physical strain and musculoskeletal problems[1].

In most workplaces, security guards work for 8 to 12 hours or more per day, often with minimal rest breaks.

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Many guards are required to stand at entry points, gates, or corridors for long periods without proper seating or posture support[2]. Some guards perform night duties, which further increases physical and mental fatigue. These working conditions can have a negative impact on the muscles, joints, and spine over time.

Musculoskeletal Disorders (MSDs) are one of the most common occupational health problems worldwide. MSDs include pain or discomfort in muscles, joints, tendons, ligaments, and nerves. Common symptoms include low back pain, neck pain, shoulder pain, knee pain, and leg fatigue[2]. Prolonged standing, poor posture, repetitive movements, and lack of ergonomic awareness are well-known risk factors for MSDs.

Among these problems, low back pain is especially common in occupations that involve prolonged standing or sitting. When a person stands for a long time without movement, the muscles of the lower back and legs become tired. Blood circulation to the muscles reduces, and pressure on the spinal structures increases[3]. Over time, this can lead to pain, stiffness, and reduced ability to perform daily activities. Security guards often report such complaints, but these problems are frequently ignored or considered part of the job[1,3].

Posture plays a major role in the development of musculoskeletal problems. Work posture refers to the position of the body while performing job-related tasks. Poor or awkward posture places extra stress on certain body parts, leading to muscle imbalance and fatigue. If such postures are maintained regularly over a long period, they can result in chronic pain and disability[4]. Therefore, identifying poor posture early is important for preventing long-term health problems.

Ergonomics is the science that focuses on designing work conditions to suit the worker, rather than forcing the worker to adapt to poorly designed work environments. Proper ergonomics helps reduce physical strain, improve comfort, and increase work efficiency. Unfortunately, in many occupational settings, especially for security guards, ergonomic principles are rarely applied[5]. Guards often do not receive any formal training on posture, movement, or safe working practices.

To assess posture-related risk at the workplace, several ergonomic assessment tools are available. One such tool is the Rapid Entire Body Assessment (REBA). REBA was developed to quickly and systematically evaluate whole-body posture during work activities. It assesses the position of the neck, trunk, legs, arms, and wrists, along with load and movement. Based on the score obtained, the level of risk can be classified as low, medium, or high, indicating whether changes are required[5,6].

REBA is widely used because it is simple, cost-effective, and does not require special equipment. It is suitable for assessing posture in occupations that involve static as well as dynamic activities. Using REBA, it is possible to identify workers who are at higher risk and recommend appropriate ergonomic interventions such as posture correction, rest breaks, and workplace modification.

Although several studies have reported musculoskeletal problems among security guards, there is limited research that uses standardized ergonomic tools like REBA to evaluate their working posture, especially in the Indian context[6,7]. Many studies focus only on pain prevalence without objectively analysing posture-related risk. This creates a gap in understanding the actual ergonomic burden faced by security guards.

Therefore, this study aims to assess the work-related postural risk among security guards using the Rapid Entire Body Assessment method. By identifying the level of postural risk and common areas of discomfort, this study highlights the need for ergonomic awareness, posture training, and preventive strategies. The findings of this study can help employers, healthcare professionals, and policymakers take necessary steps to improve the working conditions and overall health of security guards.

2. Materials and Methods

This was an observational study conducted to assess work-related postural risk among security guards using the Rapid Entire Body Assessment (REBA) method. The study was carried out in urban and rural areas of Bengaluru, Karnataka. The study population included security guards working in different institutions and workplaces. A total of 100 security guards participated in the study and were selected using random sampling based on their availability and willingness to participate. The REBA scale was used as the outcome measure to assess working posture and identify postural risk. Security guards aged 18 years and above, working for more than 3-5 hours per day, and willing to participate were included in the study. Both male and female participants were considered. Guards who were unwilling to participate, had a history of spinal deformities, had any recent fracture, surgery, or trauma, or were pregnant were excluded from the study.

2.1 Procedure

Ethical clearance was obtained from the institutional ethics committee before starting the study. The purpose of the study was explained to all participants, and written informed consent was taken.

Demographic details such as age, height, weight, and Body Mass Index (BMI) were recorded. Work-related information including working hours, type of work, and years of experience was collected using a structured questionnaire. Participants were asked about discomfort or pain experienced during work.

The posture of each participant during routine work activities was observed and assessed using the REBA worksheet. The REBA score was calculated based on body position, movement, and load.

2.2 Statistical Analysis

- Data were analysed using SPSS software (Version 29.0).
- Descriptive statistics such as mean, standard deviation, frequency, and percentage were used.
- Likelihood ratio test was used to find associations between REBA score and work-related factors.
- Pearson correlation coefficient (r) was used to find relationships between REBA score and age, height, weight, and BMI.
- A p-value < 0.05 was considered statistically significant.

3. Results

The assessment of work-related characteristics reveals: the majority of the participants had more than 5 years of experience as security guard; followed by 1 to 3 years (33%), 3 to 5 years (26%), and 1 year (3%). The work shift among the participants was found to be day (60%), rotational (22%), and night (18%). The average working hours per day was more than 10 hours per day (100%). The nature of work was sitting for long hours (17%), sitting for long hours and walking (1%), sitting for long hours and walking/patrolling (11%), standing and walking (1%), standing and walking/patrolling (1%), standing for long hours (19%), standing for long hours and walking/patrolling (16%), standing for long hours and sitting for long hours (26%), standing for long hours and walking (1%), and walking/patrolling (7%). Most of the participants experienced discomfort or pain while working (86%); and the 14% never experienced. The majority experienced discomfort frequently (70.9%); the 15.1% occasionally, and the 14% experienced daily. Among the 41% of the participants, the pain affected ability to perform work task; and 59% reported that pain did not affect their work performance. Majority of the participants sometimes (83%) take breaks to change posture, 3% frequently, 1% rarely; and the 3% never take breaks to change posture. The 16% of the participants engage in regular physical activity; and None of the participants (100%) had received any ergonomic training or guidance on posture at work (Table 3).

The most discomfort felt by the participants were lower back and legs/feet (22%); followed by legs/feet (17%), lower back (10%), neck and lower back (7%), shoulder and arms (6%), lower back and knees pain (4%), knees and legs /feet (3%), neck (3%), shoulders and arms knee legs/feet (3%), neck lower back legs/feet (2%), lower back and knee and legs/feet pain (1%), lower back and wrists /hands (1%), lower back wrists/hands knees legs/feet (1%), neck and knee pain (1%), neck and shoulder(1%), neck legs/feet (1%), right knee pain (1%), shoulder and lower back pain(1%), and wrists/

Table 1. Descriptive statistics for age, height, weight, and BMI

(n = 100)	Range	Mean	S.D.
Age (Years)	20 to 68	38.53	13.23
Height (Cm)	135 to 190	162.95	9.57
Weight (Kg)	40 to 94	62.18	10.50
BMI (Kg/M^2)	16.8 to 38.6	23.51	4.00

Age of the participants ranged from 20 to 68 years with mean: 38.53±13.23 years; height ranged from 135 to 190 Cm with mean: 162.95±9.57 Cm; weight ranged from 40 to 94 Kg with mean: 62.18±10.50 Kg; and the BMI ranged from 16.8 to 38.6 Kg/M^2 with mean: 23.51±4.00 Kg/M^2 (Table 1).

Table 2. Distribution of gender, and BMI

		Frequency	%
Gender	Male	84	84
	Female	16	16
BMI	Under weight	5	5
	Normal weight	65	65
	Over weight	24	24
	Obese class 1	5	5
	Obese class 2	1	1

Among the 100 participants; the majority were males (84%); and the 16% were females. The 65% had normal weight; followed by over weight (24%), underweight (5%), obese class 1 (5%), and obese class 2 (1%) (Table 2).

Table 3. Assessment of work-related characteristics

		Frequency	%
Work experience as a security guard	1 year	3	3
	1 to 3 years	33	33
	3 to 5 years	26	26
	More than 5 years	38	38
Work shift	Day	60	60
	Night	18	18
	Rotational	22	22
Average working hours per day	More than 10 hours	100	100
Nature of work	Sitting for long hours	17	17
	Sitting for long hours and walking	1	1
	Sitting for long hours and Walking / patrolling	11	11
	Standing and walking	1	1
	Standing and walking/patrolling	1	1
	Standing for long hours	19	19
	Standing for long hours and walking / patrolling	16	16
	Standing for long hours and Sitting for long hours	26	26
	Standing for long hours and walking	1	1
	Walking/patrolling	7	7
Do you experience discomfort or pain while working?	Yes	86	86
	No	14	14
How often do you experience this discomfort?	Occasionally (1-2 times a week)	13	15.1
	Frequently (3-5 times a week)	61	70.9
	Daily	12	14
Does the pain affect your ability to perform work tasks?	Yes	41	41
	No	59	59
Do you take breaks to change posture?	Yes, Frequently	3	3
	Yes, Sometimes	93	93
	Rarely	1	1
	No	3	3
Do you engage in regular physical activity?	Yes	16	16
	No	84	84
Have you received any ergonomic training or guidance on posture at work?	Yes	0	0
	No	100	100

hands / legs/feet; and the 14% of the participants never experienced discomfort or pain (14%) (Table 4).

The Pearson correlation coefficient: ("r") was used to find the relation of REBA score with age, height, weight, and BMI. The age (Years), height (Cm), as well as weight (Kg) were positively correlated ($p < 0.05$) with REBA score (Table 9).

4. Discussion

This study aimed to assess work-related postural risk and musculoskeletal discomfort among security guards using the Rapid Entire Body Assessment (REBA) method. The findings clearly show that a large proportion of security guards are exposed to moderate to high ergonomic

Table 4. Where do you feel the most discomfort?

		Frequency	%
Where do you feel the most discomfort?	Knees and legs /feet	3	3
	Legs/feet	17	17
	Lower back	10	10
	Lower back and knee and legs/feet pain	1	1
	Lower back and knees pain	4	4
	Lower back and legs/feet	22	22
	Lower back and wrists / hands	1	1
	Lower back wrists/hands knees legs/feet	1	1
	Neck	3	3
	Neck and knee pain	1	1
	Neck and lower back	7	7
	Neck and shoulder	1	1
	Neck legs/feet	1	1
	Neck lower back legs/feet	2	2
	Right knee pain	1	1
	Shoulder and arms	6	6
	Shoulder and lower back pain	1	1
	Shoulders and arms knee legs / feet	3	3
	Wrists/ hands / legs/Feet	1	1
	No discomfort or pain	14	14

risk during their routine work activities. These results highlight an important occupational health concern that often goes unnoticed in this group.

4.1 Postural Risk Identified Using REBA

The REBA assessment revealed that 72% of security guards were classified under the medium-risk category, while 20% were placed in the high-risk category. This means that more than nine out of ten guards are working in postures that can lead to musculoskeletal problems

Table 5. Assessment of REBA score

	Range	Mean	S.D.
REBA Score	2 to 10	6.15	1.70

The REBA Score of the participants ranged from 2 to 10 with mean: 6.15±1.70 (Table 5).

Table 6. REBA score grading

REBA Scoring	Frequency	%
Low risk, Change may be needed	8	8
Medium Risk, Further Investigation, Change soon	72	72
High Risk, Investigate and implement Change	20	20

Among the 100 participants, the 72% were found to be at medium risk, further investigation, change soon; the 20% with High Risk, Investigate and implement Change; and the 8% with Low risk, Change may be needed (Table 6).

Table 7. Association of gender, and BMI with REBA score grading

		REBA Scoring						Likelihood ratio	p value
	Low risk, Change may be needed		Medium Risk, Further Investigation, Change soon		High Risk, Investigate and implement Change				
	N	%	n	%	n	%			
Gender	Male	8	100	59	81.9	17	85	3.02	0.220
	Female	0	0	13	18.1	3	15		
BMI	Under weight	1	12.5	4	5.6	0	0	12.26	0.140
	Normal weight	5	62.5	48	66.7	12	60		
	Over weight	0	0	17	23.6	7	35		
	Obese class 1	2	25	2	2.8	1	5		
	Obese class 2	0	0	1	1.4	0	0		

The Likelihood ratio test was used to find the association of gender, and BMI with REBA score grading. The gender, as well as BMI were not associated ($p > 0.05$) with REBA score grading (Table 7).

if corrective measures are not taken. Only a small proportion (8%) were found to be at low risk.

Medium-risk postures indicate that postural correction and ergonomic modifications are required in the near future, whereas high-risk postures demand immediate intervention. The high percentage of guards in these categories suggests that their work environment and work demands are not ergonomically suitable[7-9].

4.2 Musculoskeletal Discomfort and Affected Body Regions

A major finding of this study was that 86% of participants reported experiencing discomfort or pain during work. The most commonly affected body regions were the lower back and legs/feet, either alone or in combination with other body parts. This pattern of discomfort is consistent with the nature of security work, which often involves prolonged standing, limited movement, and uneven weight distribution[10].

Lower back pain emerged as the most frequent complaint. Prolonged standing increases compressive forces on the lumbar spine and reduces muscle blood flow, leading to fatigue and pain. Continuous loading of the lower limbs also explains the high prevalence of leg and foot discomfort[11-13]. If such discomfort is ignored, it can progress into chronic musculoskeletal disorders and reduced work capacity.

Table 8. Association of work-related characteristics and REBA score grading

		REBA Scoring						Likelihood ratio	p value
	Low risk, Change may be needed		Medium Risk, Further Investigation, Change soon		High Risk, Investigate and implement Change				
	n	%	N	%	n	%			
Work experience as a security guard	1 year	0	0	2	2.8	1	5	23.33	0.001*
	1 to 3 years	5	62.5	25	34.7	3	15		
	3 to 5 years	3	37.5	22	30.6	1	5		
	More than 5 years	0	0	23	31.9	15	75		
Work shift	Day	4	50	39	54.2	17	85	7.50	0.112
	Night	2	25	15	20.8	1	5		
	Rotational	2	25	18	25.0	2	10		
Nature of work	Sitting for long hours	2	25	12	16.7	3	15	17.31	0.502
	Sitting for long hours and walking	0	0	1	1.4	0	0		
	Sitting for long hours and Walking / patrolling	0	0	9	12.5	2	10		
	Standing and walking	0	0	1	1.4	0	0		
	Standing and walking/ patrolling	0	0	1	1.4	0	0		
	Standing for long hours	2	25	16	22.2	1	5		
	Standing for long hours and walking / patrolling	3	37.5	8	11.1	5	25		
	Standing for long hours and Sitting for long hours	1	12.5	18	25	7	35		
	Standing for long hours and walking	0	0	0	0	1	5		
	Walking/patrolling	0	0	6	8.3	1	5		

Table 8. Continued...

		REBA Scoring						Likelihood ratio	p value
	Low risk, Change may be needed		Medium Risk, Further Investigation, Change soon		High Risk, Investigate and implement Change				
	n	%	N	%	n	%			
Do you experience discomfort or pain while working?	Yes	3	37.5	63	87.5	20	100	16.15	< 0.001*
	No	5	62.5	9	12.5	0	0		
How often do you experience this discomfort?	Occasionally (1-2 times a week)	1	12.5	11	15.3	1	5	14.12	0.007*
	Frequently (3-5 times a week)	2	25	48	66.7	11	55		
	Daily	0	0	4	5.6	8	40		
Does the pain affect your ability to perform work tasks?	Yes	1	12.5	28	38.9	12	60	6.20	0.045*
	No	7	87.5	44	61.1	8	40		
Do you take breaks to change posture?	Yes, Frequently	0	0	2	2.8	1	5	3.95	0.683
	Yes, Sometimes	7	87.5	67	93.1	19	95		
	Rarely	0	0	1	1.4	0	0		
	No	1	12.5	2	2.8	0	0		
Do you engage in regular physical activity?	Yes	3	37.5	12	16.7	1	5	4.53	0.104
	No	5	62.5	60	83.3	19	95		

The Likelihood ratio test was used to find the association between work-related characteristics and the REBA score grading. The years of experience as a security guard, experience discomfort or pain while working, how often do you experience this discomfort? as well as does the pain affect your ability to perform work tasks? were associated ($p < 0.05$) with REBA score grading (Table 8).

Table 9. Relation of REBA score with age, height, weight, and BMI

	REBA Score	
	"r"	p value
Age (Years)	0.505	< 0.001*
Height (Cm)	0.255	0.010*
Weight (Kg)	0.321	0.001*
BMI (Kg/M^2)	0.127	0.207

("r" = Pearson correlation coefficient; * Significant).

4.3 Influence of Work Experience

The results showed a significant association between years of work experience and REBA score grading. Security guards with more than five years of experience were more likely to fall into the high-risk category[14]. This suggests that long-term exposure to poor posture and static work conditions leads to cumulative musculoskeletal strain.

Although experienced workers may become more familiar with job demands, repeated exposure to incorrect posture over several years can cause gradual wear and tear of muscles, joints, and ligaments. This finding highlights that experience alone does not protect against ergonomic risk.

4.4 Role of Age in Postural Risk

Age showed a strong positive correlation with REBA scores, indicating that older guards had higher postural

risk. As individuals age, muscle strength decreases, joint flexibility reduces, and recovery from physical stress becomes slower. These physiological changes make it more difficult for older workers to maintain proper posture for long hours.

When job demands remain the same regardless of age, older security guards become more vulnerable to musculoskeletal problems[15-17]. This finding emphasizes the need for age-sensitive workplace policies and ergonomic support.

4.5 Effect of Height and Weight

Height and weight were also positively correlated with REBA scores. Taller or heavier individuals may experience greater mechanical stress on the spine and lower limbs during prolonged standing or walking. In many workplaces, security posts, seating, and equipment are not adjustable according to individual body dimensions.

Poorly designed workstations force guards to adapt their posture to the environment rather than the environment being adapted to the worker. Although BMI was not statistically associated with REBA grading, overweight individuals still showed higher discomfort levels, suggesting that body weight plays a role in musculoskeletal strain.

4.6 Work-Related Characteristics and Pain

The study found that the presence of pain, frequency of pain, and pain affecting work performance were significantly associated with higher REBA scores. Guards who experienced frequent or daily pain were more likely to be in the high-risk category.

Pain that affects work performance can reduce alertness, efficiency, and job satisfaction. In security work, reduced performance may have serious consequences, as constant attention and physical readiness are required.

4.7 Lack of Ergonomic Training

One of the most concerning findings was that none of the participants had received ergonomic training or posture guidance. This indicates a major gap in occupational health education. Without ergonomic awareness, guards may not know how to stand correctly, when to change posture, or how to reduce strain during long shifts.

Simple ergonomic education, such as teaching posture correction, micro-breaks, and stretching exercises, can significantly reduce musculoskeletal risk[18]. The absence of such training likely contributes to the high REBA risk observed in this study.

4.8 Comparison with Previous Studies

The findings of this study are consistent with earlier research conducted on security guards and other workers involved in prolonged standing occupations. Previous studies have reported high prevalence of lower back pain, leg discomfort, and moderate to high ergonomic risk in similar populations.

Studies using REBA and other ergonomic assessment tools have repeatedly shown that poor posture, long working hours, and lack of ergonomic intervention are key contributors to musculoskeletal disorders. The present study strengthens this evidence by providing detailed postural risk assessment in an Indian occupational setting.

4.9 Occupational and Public Health Implications

The results of this study have important implications for occupational health and workplace safety. Musculoskeletal discomfort not only affects physical health but also impacts work performance, productivity, and quality of life[19,20]. Chronic pain can lead to absenteeism, reduced efficiency, and long-term disability. Security guards perform a critical role in maintaining safety and order. Ensuring their health and well-being should be a priority. Low-cost interventions such as posture breaks, ergonomic training, and adjustable seating can produce significant benefits.

4.10 Occupational Factors Contributing to Postural Problems

The findings of this study suggest that several occupational factors contribute to the high postural risk observed among security guards. Long working hours, prolonged static posture, lack of ergonomic awareness, limited physical activity, increasing age, and cumulative work exposure appear to be major contributors. Continuous standing or sitting without adequate posture variation increases mechanical stress on the spine and lower limbs. Over time, this may lead to chronic musculoskeletal discomfort and reduced work efficiency.

5. Limitations of the Study

This study has some limitations. Being an observational study, it cannot establish cause-and-effect relationships. Discomfort was self-reported, which may introduce reporting bias. The study was conducted in a specific geographic area, which may limit generalizability. The study sample consisted predominantly of male participants, reflecting the gender distribution in the security workforce. Future studies may consider a more balanced gender representation to improve generalizability of findings.

6. Practical Recommendations

Based on the findings of this study, several practical measures can be implemented to reduce postural risk among security guards. Providing structured ergonomic training and posture education can improve awareness and self-correction of posture. Encouraging regular posture breaks and task variation can reduce continuous muscle strain. Introducing adjustable seating and ergonomically designed workstations can help accommodate different body dimensions. Promoting regular physical activity and stretching exercises may improve muscular endurance and flexibility. Periodic posture assessment using tools such as REBA can help in early identification of risk and timely intervention.

7. Future Scope

Future research should involve larger and more diverse samples, include longitudinal follow-up, and evaluate the effectiveness of ergonomic interventions. Including psychosocial factors such as stress, fatigue, and job satisfaction may provide a more comprehensive understanding of musculoskeletal risk.

8. Conclusion

This study demonstrates that security guards are exposed to significant postural risk and musculoskeletal discomfort due to prolonged standing, extended working hours, and lack of ergonomic awareness. The majority of participants were classified under medium to high REBA risk categories. Lower back and lower limb discomfort were most commonly reported. Early identification of postural risk and implementation of ergonomic interventions are essential to protect the health and productivity of security guards.

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10. Funding and Conflict of Interest

10.1 Funding

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10.2 Conflict of Interest

The authors declare that there are no conflicts of interest related to this study.

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