Postural assessment of retail checkout operators

■ **Nabila Rehman and Namrata Arora Charpe**

■**ABSTRACT :** In retail industry checkout operators or cashiers play pivotal role in the system by performing repetitive manual material handling tasks while scanning and handling products which requires to select, grab, lift, orientate, move and place various articles at checkstands or tills along with static work posture which result in high risk of musculo-skeletal disorders, awkward postures, muscle fatigue and other discomforts such as back pain, disc pressure, reduced circulation, pregnancy related problem etc. among the checkout operators. The research paper elucidates the risk checkout operators are being exposed during their occupational hours. Study was carried out on 250 checkout operators with minimum 6 months of experience in the same job profile using postural analysis tool REBA method. Video of the subjects was captured performing entire checkout process and snapshots were taken from the video for the analysis. The result divulges that Task I and Task II *i.e.* manual material handling and monetary transaction are the most demanding tasks which have been found to be exposed to high risk for long duration in the entire checkout process with more than half of the population 61.6 per cent postures of checkout operators were found to be unacceptable and require corrective action including further assessment as soon as possible. However, only 6.4 per cent of sample in manual material handling task and 5.2 per cent in monetary transaction reported very high risks and testified that corrective action along with further assessment is necessary at the existing workstation. Besides less than half *i.e.* 46.7 per cent of operators described the task of customer handling as medium risk in which corrective action along with further assessment seems to be necessary. As a result above investigation recommends redesigning of checkstand with respect to Indian anthropometry followed by ergonomic training and awareness to enhance efficiency of retail operators and minimize their occupational health hazards.

■ **KEY WORDS:** Postural assessment, Retail, Cashiers, REBA

See end of the paper for authors' affiliations

Nabila Rehman
Faculty of Home Science,
Banasthali Vidyapith, Banasthali
(Rajasthan) India
Email : nabila.rhmn@gmail.com

Retail industry is becoming more intricate and changing at an ever-increasing speed. Retailing is undergoing an evolution with the rise of supermarkets. Supermarket checkout work varies throughout the world and has received huge consideration amid risk managers, researchers and regulators. The checkout operation in supermarket varies considerably between stores yet the work of checkout operator comprises handling of large number of items each working day. The checkout operators are the personnel who are employed in supermarket, scanning goods through machine and take payment from the customers.

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The job of the checkout personnel comprises operating till system, scanning items of different size and weight which customer has chosen, weighing and pricing certain items such as fruits and vegetables, using special tools to remove security tags, processing loyalty cards, coupons and vouchers, informing customer about promotional activities, answering their queries and taking payment from them.

The repetitive nature of checkstand operators job produces a regular physical load on operators as they are required to select, grab, lift, orientate, move and place articles repetitively during work hours (Schmidt *et al.*, 1988) which results in physiological discomfort and disorders associated with neck, shoulder, upper limb, back, lower limb and foot (Lannersten and Harms-Ringdahl, 1990 and Ryan, 1989). Various factors have been found associated with increase in risk of significant injuries/harms to the health of checkout operators due to static work posture. Posture has been defined as the alignment of body segments at a particular time (Gangnet *et al*., 2003) which is associated with the hazards related to Posture such as low back pain (Kroemer *et al.*, 1994) and greater disc pressure (Andersson and Ortengren, 1974) while foot and leg swelling, reduced circulation, varicose veins and lower extremity discomfort have been shown to occur in both sitting and standing posture (Rodacki and Vieira, 2010 and Shoprite Supermarkets NIOSH HETA Report 88-344-2092).

As a result the study has been designed to gauge the posture and its associated risks faced by retail checkout operators (cashiers) with help of ergonomic tool called REBA (Rapid Entire Body Assessment) 2000 (Hignett and McAtamney, 2000) which make use of a systematic process for analyzing the whole body posture indicating musculo-skeletal risk level and an action level with an indication of urgency.

Checkstand work in retail stores has been ranked among top 12 industries for contributing non-traumatic soft tissue disorders of the neck, back and upper extremities (Silverstein *et al.,*2003). Various findings have provided evidences between relationship among supermarket checking postures, activities and the development of injury symptoms (Lehman, 2001; Niedhammer *et al.,* 1998 and Orgel *et al.*,1992). These grievances are commonly known as musculo-skeletal injuries or musculo-skeletal disorders (Checkout workstation in retail-safe design and work practices,

2005). Several studies conducted on checkout operators (sitting and standing) report glitches associated with musculo-skeletal disorders (Baron *et al.,* 1991; LSF: Labor Force Survey, 2014; Margolis and Kraus, 1987 and OSHA, 2014). Checkout operators are at great risk of MSDs due to repetitive nature of job which is required to be carried for whole shift. WMSDs have been recognized as a serious problem worldwide. In Australia, according to available workers compensation statistics, about 59 per cent of all injuries/disease cases are related to musculo-skeletal disorders (ASCC, 2012). In 2011, MSD cases range 387,820 and account for 33 per cent of all worker injury and illness cases reported by BLS; while in Britain, the total number of MSD cases in 2013-14 was 526 000 out of a total 1 241 000 for all work-related illnesses as per Labor Force Survey (LFS). Prevalent discomforts confronted by cashiers/checkout operators was found in lower back (31%), neck (25%), shoulders (24%) and buttocks (22%) which lead MSDs mainly due to the poor posture maintained by operators while carrying out checkstand activities at poorly designed workstation for long duration of time (Osorio *et al.,*1994).

Also checkout operators who use electronic scanner appear at high risk for upper extremity MSDs (Grant and Habes, 1995). Besides few studies mention that checkout operators can handle 500 to 1000 grocery items per hour- the equivalent of 6000 pounds of goods in a typical shift and spend upto 45-50 per cent of the customers transaction time in scanning or handling products, considered as manual material handling (MMH) which accounts for one of the main reasons behind carpel tunnel syndrome and cumulative trauma disorder amongst the population (Lehman,1998).

■ RESEARCH METHODS

Study was carried out on 250 checkout operators of various retail stores situated in Bhopal and Jaipur (capital city of Madhya Pradesh and Rajasthan state) with minimum six months of experience in the same job. Samples were visited at variousretail stores after acquiring the permission from respective management, preferably in early morning and afternoon in weekdays as checkout operators were relatively free during those slots (holidays and evening shifts were absolutely prohibited because of the peak hours). The operators were enquired only when they were not entertaining any customer during their working hours. The tasks and

postures for assessment were identified by observing the checkout operators during multiple work cycles. The postures held for the longest duration of work cycle or where the highest loads occurred was selected. To conduct the assessment by REBA at each workstation, the cashiers wereeither observed or videotaped during his/her routine job activities. The job of checkout operators has been studied and classified broadly into three main tasks namely: manual material handling, monetary transaction and customer dealing. Snapshots of three main tasks of checkstand activities were taken from the captured video and are used to fill the scores of REBA in order to assess the posture and associated musculo-skeletal risks among checkout operators.

REBA method:

Rapid entire body assessment (REBA) is an ergonomic tool; developed by Hignett and McAtamney (2000) which uses systematic process to assess whole body postural MSDs (musculo-skeletal disorders) and risks associated with job tasks. In the spectrum of postural analysis tools, REBA lies between the detail event-driven system (three dimensional observation system, NIOSH equation etc) and time-driven tools (OWAS- Ovako working posture analysis system).

Application of REBA:

REBA can be applied when the whole body is being used with variability of posture such as static, dynamic, rapidly changing and unstable and/or with load being handled either frequently or infrequently and/or monitored pre/post change or modifications to the workplace, equipment, training etc.

Procedure of REBA:

REBA is carried out in six steps: Observation of the tasks, selection of posture for assessment, scoring of the postures, processing of scores, establishing the REBA score and confirming the action level with respect to the urgency of control measures.

Once the tasks has been observed with the help of the captured video, selection of the most demanding task in term of time and posture were estimated and are obtained in form of snapshot. Further REBA score sheet is prepared by evaluating the posture of different body parts.

REBA score sheet is divided into two body segment

Section A and Section B. Section A (left side) covers neck, trunk and legs whereas Section B (right side) covers the upper arm, lower arm and wrist ensuring the assessment of any awkward or constrained posture of neck, trunk or leg which might get influenced from upper arm, lower arm and wrist. Posture score A and posture score B is obtained with the help of standard Table. The loading or coupling scores were added to posture score A and posture score B to obtain score A and B, respectively (McAtamney and Corlett, 1993). Combination of score A and score B give the grand score with the use of standard table and table score C is obtained. After this the activity score is added in the table score C and the final REBA score is obtained.
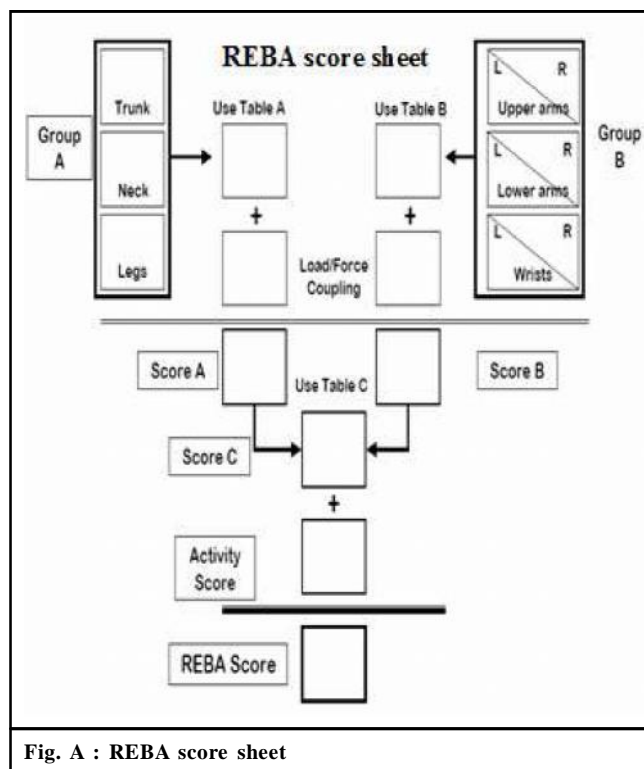

Fig. A : REBA score sheet

The range of grand score varies from 1-11 and reflects the musculo-skeletal loading associated with the worker's posture and the level of action required. Low score of 1 indicate that the work posture is acceptable if not maintained or repeated for long time (action level 1), for low score of 2-3, further investigation is needed and changes may be necessary (action level 2). Investigation and changes are required for score of 4-7 (action level 3). Further assessment and changes are required soon

Table A: REBA score

REBA score	REBA	Score calculator
	Risk level	Action level
1	Negligible	Corrective action including further assessment is not necessary
2-3	Low	Corrective action including further assessment may be necessary
4-7	Medium	Corrective action including further assessment is necessary
8-10	High	Corrective action including further assessment is necessary soon
11-15	Very high	Corrective action including further assessment is necessary now

for score 8-10 (action level 4). Further investigation and the changes required immediately for the score of 11 and onwards. REBA action level is shown in Table A. REBA score 1 show the negligible risk level, REBA score 2-3 shows the low level risk, REBA score 4-7 shows the medium level risk, REBA score 8-10 shows the high level risk. REBA score 11-15 show very high level risk.

■ RESEARCH FINDINGS AND DISCUSSION

Checkout operators were visited at the retail stores after acquiring the permission from management, preferably in early morning and afternoon in weekdays as checkout operators were relatively free during those slots (holidays and evening shifts were absolutely prohibited because of the peak hours). The operators were enquired when not entertaining any customer during their working hours. Checkout operators of supermarkets were approached and the operators with minimum 6 months of experience were surveyed due to the developed occupational hazards in duration of 6 months.

Table 1 illustrates the demographic information of the operators.

From the Table 1, it can be derived that the sample comprises 71.2 per cent of male and 28.8 per cent of females engaged as checkout operators of which 50.8 per cent falls in 21-25 years of age whereas only 32.8 per cent of operators fall under 26-30 years of age,

Table 1 : Demographic information of checkout operators

Attribute	Particulars	Frequency (n=250)	Percentage
Gender	Male	178	71.2%
	Female	72	28.8%
Age (Years)	Upto 20	15	6.0%
	21-25 yrs	127	50.8%
	26-30 yrs	82	32.8%
	31-35 yrs	23	9.2%
	36-40 yrs	3	1.2%
Marital Status	Unmarried	153	61.2%
	Married	83	33.2%
	Widow/ Widower	4	1.6%
	Divorced	10	4%
Experience in existing job (year)	<1 yr	105	42.0%
	1-2 yrs	68	27.2%
	2-3 yrs	42	16.8%
	3-4 yrs	10	4.0%
	4-5 yrs	12	4.8%
	>5 yrs	13	5.2%
BMI	Underweight	12	4.8%
	Normal weight	122	48.8%
	Over weight	116	46.4%

however, none of the operators reported to be above 40 years. BMI of checkout operators was normal weight with the mean of 24.47±2.32, with minimum of 15.24 and maximum 28.62 scores. Detailed assessment of BMI reveals that almost half of the sample *i.e.* 48.8 per cent of the operators were normal weight whereas 46.4 per cent of operators were found to be overweight with only 4.8 per cent being underweight. However, none of the operators were found to be obese. However, about 60 per cent of the population unmarried and almost half *i.e.* 42 per cent of the sample is having less than one year of experience.

The results obtained from REBA assessment worksheet are shown in Table 2 and 3 predicting different categories of risk level checkout operators are exposed to. It was found that varied tasks call for distinct action levels such as Manual material handling and monetary transaction bears high risk and calls for corrective action and further assessment at workplace as soon as possible with 61.6 per cent individually whereas customer handling lays medium risk on checkout operators and calls for further necessary assessment and following corrective actions.

Task I concerns all the operations which requires in handling of the merchandise right from the trolley of the customer to the counter where goods scan, during this operators are required to lift merchandise from the trolley whereby they bend and pick up multiple objects in a single transaction often followed by dragging of article from the one end of the counter towards the operator

for scanning subsequently putting scanned articles back in the trolley. In this task 6.2 per cent operators were classified under very high risks flowed by 61.6 per cent of operators fall under high risk level whereas 32 per cent falls under medium risk category. Task II is monetary transaction which encompasses handling till where the entries are being made and taking the payments through cards or cash, in this task 5.2 per centa operators falls under very high risk followed by 61.6 per cent of subjects who displayed high risk while 33.2 per cent were exhibited medium risk. Task III is customer handling which embraces dealing with customers, exchange wishes, processing and maintenance of memberships and loyalty cards etc. expose 46.4 per cent of the operators to the medium risk engaged in this activity while 26.4 per cent reported higher risk.

Thus the result divulges that Task I and Task II *i.e.* manual material handling and monetary transaction, more than half of the population 61.6 per cent was found to be exposed to high risk for long duration in the entire checkout process. Therefore, the postures of checkout operators were found to be unacceptable and necessary changes have been suggested as per rapid entire body assessment worksheet.

During Task I of checkout process, operators are required to bend repeatedly to pick up articles of varied size, composition and mass from trolley for scanning and put it back after scanning which directs strain on various muscles resulting in MSDs into lower back (31%), neck (25%), shoulders (24%) and buttocks (22%) mainly due

Table 2: Distribution of REBA score in Checkout task

Checkout task	REBA score (%)				
	1	2-3	4-7	8-10	11-15
Manual material handling	-	-	32	61.6	6.4
Monetary transaction	-	-	33.2	61.6	5.2
Customer dealing	-	27.2	46.4	26.4	-

Table 3: Frequency and percentage of checkout operators engaged in risk

TASK		REBA score (FREQ and %)			
		2-3	4-7	8-10	11-15
Task I Manual material handling	Freq	0	80	154	16
(n=250)	%age	0	32	61.6	6.4
Task II Monetary transaction	Freq	0	83	154	13
(n=250)	%age	0	33.2	61.6	5.2
Task III Customer dealing	Freq	68	116	66	0
(n=250)	%age	27.2	46.4	26.4	0

to the poor posture and grips maintained by operators while carrying out checkstand activities at poorly designed workstation for long duration of time (Porter *et al.*,1991). Static posture during scanning articles with the help electronic scanner accounts for one of the main reasons behind carpel tunnel syndrome and cumulative trauma disorder amongst the operators (Lehman, 1998).

Conclusion:

On the basis of the analysis of results obtained it can be concluded that 61.6 per cent of the workers are exposed to high risk while manual material handling and monetary transactions and the changes in the workstation should be incorporated immediately as present checkstands are not designed following Indian anthropometry and therefore does not permit uphold posture and trigger various occupational health problems associated with posture, MSDs, physical and emotional stress, low productivity and poor quality of work. Additionally ergonomic trainings need to be imparted for effective of use existing workstations and ergonomic awareness about minimizing occupational health hazards through exercises should be incorporated at retail stores which employ checkout operators.

Authors' affiliations:
Namrata Arora Charpe, Faculty of Home Science, Banasthali Vidyapith, Banasthali (Rajasthan) India

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