Low back pain as an occupational risk among supermarket cashiers in KwaZulu-Natal, South Africa

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ABSTRACT

Background: Work-related low back pain (LBP) has received growing attention, especially regarding the effect it has on work productivity and activities of daily living (ADL). Supermarket cashiers are at high risk of LBP due to maintaining awkward postures for prolonged periods.

Objectives: To investigate the prevalence and intensity of LBP among supermarket cashiers in KwaZulu-Natal, South Africa, and to identify occupational and non-occupational risk factors for LBP.

Methods: Supermarket cashiers from 12 conveniently selected stores of a major South African supermarket franchise were included in this cross-sectional study. Questionnaires were administered in October and November 2018. Mean LBP disability scores were used as a measure of pain intensity experienced during various activities. Univariate analysis of variance (ANOVA) was used to measure the effect size of different variables on the LBP intensity score. The associations between LBP and both occupational and non-occupational factors were assessed using Fischer's exact test and forward stepwise logistic regression analysis.

Results: One hundred and forty-six cashiers participated in the study. Most of the participants reported having minimal LBP (n = 132, 90.4%), indicating that they could cope with most living activities. Based on the mean disability scores, only the effect size of age was large. The odds of having LBP were associated with age 30 years and older (p = 0.001), race other than black African (p = 0.037), and working for more than 10 hours a day (p = 0.039).

Conclusion: Reporting of LBP was common among the supermarket cashiers in this study. Older workers are at a higher risk of having LBP, which may be exacerbated by long working hours. Workplace interventions such as ergonomic programmes, structured and defined working hours, and home-based interventions such as exercise therapy, should be implemented.

INTRODUCTION

Working conditions, such as work hours/shifts, the time spent standing and sitting, and the number and duration of breaks, differ between workplaces. Among several trauma disorders, back problems have been reported as the most frequent cause of low back pain (LBP) among supermarket cashiers,[1] and may be associated with physical activity performed during the workday.[2] Low back pain is documented as the leading cause of disability, worldwide, resulting in work absence.[3-6] Researchers report that 5.0–10.0% of all LBP cases become chronic.[7] Low back pain also results in dependency, institutionalisation and increased healthcare costs.[8] In a systematic review of cohort and cross-sectional population-based studies, Meucci et al. (2015) reported a prevalence of chronic LBP among adults of 4.2% for those aged 24 to 39 years, and 19.6% for those aged 20 to 59 years.[7]

The lower back is reported as the body region most affected by pain and discomfort.[9,10] Previous studies among supermarket cashiers, and among women with non-specific LBP, reported that sitting for long periods of time affects the lower back region.[9,10] Supermarket cashiers, as an occupational group, tend to remain sitting for most of their working day. Low back pain has also been reported to be a common acute and chronic condition among those whose work requires axial twisting, lateral bending and regularly assumed awkward postures.[11,12] Cashiers' activities include reaching out, scanning, typing on keyboards, and grasping and lifting heavy items, usually with one hand. They may experience sprains as a result of awkward postures while leaning over the counter and twisting their upper bodies to reach goods.[13]

Research on the prevalence of LBP in supermarket cashiers and associated risk factors can provide insight into the occupational risk factors in a seldom researched and vulnerable group of workers. Findings may assist in developing strategies to reduce the incidence of LBP in this group of workers. To the best of our knowledge, no study has researched LBP in supermarket cashiers in South Africa, most of whom are women.

The objectives of the study were to estimate the prevalence and intensity of LBP among supermarket cashiers in KwaZulu-Natal, South Africa, and to identify occupational and non-occupational risk factors for LBP.

METHODS

This was a cross-sectional study, which took place from October to November 2018. The website of the chosen grocery retail brand stated that there were 17 supermarkets in Durban, KwaZulu-Natal. The study population size was approximately 255 since each store employed at least 15 cashiers at the time of inquiry. The number of participants required was calculated as 154, using the Raosoft® software programme. The criterion for inclusion in the study was that cashiers should have worked for at least one year. Twelve of the 17 stores in Durban were conveniently selected and 200 participants who met the inclusion criteria were invited to participate in the study.

The Oswestry Disability Index (ODI), considered to be the gold standard tool used to measure LBP, was adapted for this study,[14] and used as

a guideline when designing the interviewer-administered questionnaire. Information collected included demographic characteristics (sex, age and race); occupational factors such as duration of employment, hours worked per day and week, workload, and repetition and monotony of tasks; and levels of fatigue and physical activity during daily activities of living. Intensity of LBP experienced while performing occupational and non-occupational activities was calculated as an 'LBP disability score', using the ODI.

Data were analysed using SPSS version 25.0. Significance was set at 0.05. Univariate analysis of variance (ANOVA) was used to determine the effect size of different variables on the LBP intensity score, i.e. the degree of association. The associations between LBP (yes/no) and various activities were assessed using Fischer's exact test and forward stepwise logistic regression analysis.

Ethics clearance was provided by the Durban University of Technology Research and Ethics Committee (IREC Number 084/18).

RESULTS

A total of 146 questionnaires were completed from 200 invited participants (response rate of 73.0%). Table 1 summarises the demographic characteristics of the study participants. Most were female (n = 109, 74.7%), and most were black African (n = 132, 90.4%). The mean age of the study participants was 26.0 years (27.0 years and 25.9 years, for males and females, respectively). Overall, 41 (28.1%) reported having LBP (Table 1).

As shown in Table 2, most of the participants (n = 132, 90.4%) were categorised as having minimal LBP disability, indicating that they could 'cope with most living activities'.[14] Twelve (8.2%) had moderate LBP disability, and two had severe disability. The ODI interpretation of moderate disability is that pain is experienced when sitting, lifting and standing. In addition, *"travel and social life are more difficult, and the person may be disabled due to work activities; personal care, sexual activity and sleeping are not grossly affected. Activities of daily living are affected in those with severe LBP disability"*.[14]

The effect size of LPB intensity, determined using univariate ANOVA, was large for the daily number of hours worked (> 10 hours per day), and pain experienced (Table 1). However, only two of the participants reported working for more than 10 hours a day. Although the differences in the mean scores for the different values were relatively large for some of the other variables, such as age and number of years worked, the effect sizes were small.

The unadjusted odds of reporting LBP were significant only for age. Similarly, only age was significantly associated with LBP in the logistic regression model; adjusted OR 13.62, 95% CI 3.61–52.18; p = 0.001 (data not shown).

Table 1. LBP scores and effect sizes of different variables on LBP

Variable	Value	n	%	LPB score Mean ± SD	p value	Partial eta squared	Effect size
Age	< 30	102	69.9	2.67 ± 5.78	0.288	0.024	Small
	≥ 30	44	30.1	6.16 ± 8.02			
Sex	Male	37	25.3	2.54 ± 5.33	0.732	0.003	Small
	Female	109	74.7	4.26 ± 7.05			
Race	Black African	132	90.4	3.82 ± 6.83	0.487	0.010	Small
	Other	14	9.6	3.09 ± 4.85			
Years working as a cashier	< 5	127	87.0	3.40 ± 6.21	0.815	0.001	Small
	≥ 5	19	13.0	6.42 ± 8.88			
Hours of work – daily	≤ 10	144	98.6	3.53 ± 6.31	0.009	0.135	Large
	> 10	2	1.4	23.00 ± 1.41			
Hours of work – weekly	≤ 48	99	67.8	4.20 ± 7.21	0.307	0.022	Small
	> 48	47	32.2	2.61 ± 4.86			
Fatigue level at end of shift*	High	92	63.0	2.98 ± 5.71	0.444	0.013	Small
	Low	54	37.0	4.94 ± 7.77			
Rushing to complete tasks†	Often	100	68.5	3.72 ± 6.65	0.918	0.000	Small
	Not often	46	31.5	3.96 ± 6.77			
Physical activity†	Not often	132	90.4	3.96 ± 6.83	0.655	0.004	Small
	Often	14	9.6	2.71 ± 5.30			
Pain experienced	No	105	71.9	0.76 ± 2.28	0.000	0.364	Large
	Yes	41	28.1	11.56 ± 7.84			

*High: high every day or every second day of the week; Low: high once a week or once every two weeks
†Often: every day or every second day of the week; Not often: once a week or once every two weeks

Table 2. LBP disability categories and intensity scores of study participants

LBP disability	n	%	Mean ± SD	Median	25th percentile	75th percentile
Minimal (0–20%)	132	90.4	2.0 ± 3.5	0.00	0.00	3.00
Moderate (21–40%)	12	8.2	19.2 ± 3.1	19.00	18.00	22.00
Severe (41–60%)	2	1.4	31.0 ± 4.2	31.00	28.00	34.00
All	146		3.8 ± 6.7	0.00	0.00	4.00

The adjusted odds of LBP were almost 14 times higher for cashiers aged 30 years and older than for those younger than 30 years (OR 13.72, 95% CI 3.51–52.18; p = 0.001) – data not shown.

DISCUSSION

Although LBP is a common occupational health problem, few epidemiological studies have investigated its prevalence among supermarket cashiers. Almost 30% of cashiers who participated in our study reported that they had LBP, but most (around 90%) had minimal LBP disability, categorised using the ODI;[15] 10% had moderate or severe disability. This prevalence is similar to findings from other studies on supermarket workers. In a study published by Violante et al. (2005), among supermarket workers in central-northern Italy, the overall 12-month prevalence of LBP was 34.5% (36.6% for females and 30.7% for males).[15] In a Brazilian study of 360 supermarket workers, treated in a physiotherapy clinic, Da Silva et al. (2015) reported musculoskeletal disorders, associated with work activities and conditions at work, as the most common cause of pain.[16] About a third of the study participants were cashiers (31.2%), and almost a quarter (21.4%) were treated for LBP. Other studies have reported higher prevalences; for example, Erick et al. (2021) reported a prevalence of LBP of 68.3% in a study on 174 cashiers in Botswana.[17]

Cashiers spend most of their day in a sitting position, which is considered to be a risk factor for LBP.[18] Tissot et al. (2009) looked at associations between LBP and working postures in a large study in Quebec, Canada, but found that constrained sitting was not a risk factor for LBP.[19] However, they did state that the sample size of the constrained sitting group was small.

In a recent study on 193 supermarket cashiers in Saudi Arabia, Algarni et al. (2022) used the same tool (the ODI) as we did to measure level of disability and factors associated with LBP.[20] As in our study, most participants experienced minimal disability (56.7%); 34.6% reported moderate disability – a higher proportion than in our study. We found that long work hours (≥ 10 a day) and LBP itself were significantly associated with LBP intensity in our study.

Although only hours of work (≥ 10) and LBP itself were significantly associated with LBP intensity among the study participants, age was the only factor that was significantly associated with reporting LBP, overall. Age has been shown to be a risk factor for LPB in other studies on cashiers. In Erick et al.'s (2021) study, young cashiers (< 26 years) were less likely to report LBP.[17] Other risk factors for LBP included length of employment, poor workstation layout, and serving more than 100 customers per day. In an experimental study, in which eight participants performed simulated tasks of handling products of different weights, Rodacki et al. (2006) showed that checkout points where large and repeated movements are required can cause strain and, consequently, postural problems.[2] We did not consider the work space per se, but ergonomics should be considered when assessing LBP and other musculoskeletal disorders among cashiers.

We did not find any associations with LBP and occupational factors. Nor did Sirge et al. (2014) in a study on 67 female supermarket cashiers in Estonia.[21] However, the study sample sizes were small in both our and Sirge et al.'s studies, which might explain the lack of significant associations. In Algarni et al.'s study, the number of working days per week, the preferred working position, and the need to assume awkward positions were occupational factors that were significantly associated with musculoskeletal disorders (MSDs).[20]

Interventions aimed at reducing the incidence and prevalence of LBP among supermarket cashiers need to be applied. In a systematic review and meta-analysis of LBP interventions, Russo et al. (2021) concluded that exercise programmes in the workplace reduce LBP symptoms, improve muscle strength and flexibility, and increase the quality of life of office workers.[22] However, a separate meta-analysis showed that physical exercise at the workplace did not reduce the occurrence of LBP,[23] but that interventions for the prevention of LBP and exercise interventions, with or without educational interventions in the workplace, have the potential to prevent LBP.

Workplace interventions should address LBP at the 'exposure stage'. For example, the National Institute for Occupational Safety and Health has recommended that a seven-step ergonomic programme be established, which comprises 1) identifying and mitigating risk factors, 2) involving and training management and workers, 3) collecting health and medical evidence, 4) implementing, 5) evaluating ergonomics programmes, 6) promoting worker recovery through healthcare management and return to work, and 7) maintaining management commitment and employee involvement.[24] Other preventive measures to reduce the risk of LBP include scheduled rest periods and educational programmes to teach cashiers about body mechanics, and ensuring that work stations are ergonomically designed.

Home-based interventions for LBP should include exercise therapy, including movements that involve stretching, and strengthening the muscles of the back to release tension. Recreational sport is also a preventive activity for avoiding muscular discomfort.

Limitations

The validity of the findings from this study are limited by the small sample size, and cannot be generalised to the other supermarket cashiers in South Africa. A larger study should be conducted to validate the findings and assess other risk factors for LBP that have been reported in the literature. Body mass index (BMI) is a risk factor for LBP but was not measured in this study, as it was found that the measurement tool was inaccurate. The results are therefore not presented.

CONCLUSION

The findings from this study provide evidence that LBP is common among supermarket cashiers in South Africa. Measures should be taken in both the workplace and the home, to prevent LBP, rather than treat it. Interventions should be targeted at older workers who are at higher risk of developing LBP.

KEY MESSAGES

1. Reported LBP was common in this group of cashiers.
2. Most participants had minimal LBP disability, which meant that they could cope with most daily activities.
2. Older age was associated with increased LBP.
3. No occupational risk factors for LBP were identified.

DECLARATION

The authors declare that this is their own work; all the sources used in this paper have been duly acknowledged and there are no conflicts of interest.

AUTHOR CONTRIBUTIONS

Conception and design of the study: SG, PG, JDP
Data acquisition: PG
Data analysis: DS, SG, PG, JDP
Interpretation of the data: DS, SG, PG, JDP
Drafting of the paper: SG, PG, DS, JDP
Critical revision of paper: DS, SG, PG, JDP

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