



# Ergonomics posture and movement analyses of supermarket checkout operators in the city of Cataguases, MG

## *Análise ergonômica dos movimentos e posturas dos operadores de checkout em um supermercado localizado na cidade de Cataguases, Minas Gerais*

Josiane Aparecida Cardoso de Souza<sup>1</sup>  
Mauro Lúcio Mazini Filho<sup>2</sup>

**Abstract:** Ergonomics is important to relate the understanding between the man and the work surroundings through the application of principles, that aims to bring safety, welfare and worker comfort. This study was conducted in a supermarket located in Cataguases and aimed to analyze the risks that cashiers are exposed through the movements and postures during the execution of the activities, the pains that affect them, the degree of risk they are submitted in their jobs and the main activities that contribute to the development of musculoskeletal disorders. Participated in the survey 14 supermarkets checkout operators and, to obtain these results, it was used the method Rapid Upper Limb Assessment (RULA), Body Diagram, Check List and Questionnaire. The results showed that the cashiers are prone to occupational hazards such as RSI / WMSD from the activities they perform, postures, physical overload, repeatability, effort and workstation inadequate. The body parts most affected are lower and upper back, neck, shoulders, legs. Thus, actions are necessary to more detailed investigation and urgently changes in workstation to the fulfillment of NR 17 and to improve workstations supermarkets checkout operators, minimizing the risks as RSI / WMSD and the deployment of labor gymnastic.

**Keywords:** Ergonomics; Ergonomic analysis of work; Work organization; Quality of work life.

**Resumo:** A ergonomia é fundamental para relacionar o entendimento entre o homem e o ambiente do trabalho por meio da aplicação de princípios e tem como objetivo trazer segurança, bem-estar e conforto ao trabalhador. Este estudo foi realizado em um supermercado localizado na cidade de Cataguases, Minas Gerais. O objetivo foi analisar os riscos a que os operadores de checkout estão expostos por movimentos e posturas adotadas durante a execução das atividades, as dores que os acometem, o grau de risco a que estão submetidos em seu posto de trabalho e as atividades que mais contribuem para o desenvolvimento de doenças osteomusculares. Participaram da pesquisa 14 operadores de checkout e, para a obtenção dos resultados, foram utilizados: Questionário, método Rapid Upper Limb Assessment (RULA), Diagrama de corpo e Check List. Os resultados mostraram que os operadores de caixa são propensos a riscos ocupacionais como LER/DORT provenientes das atividades executadas, posturas inadequadas, sobrecarga física, repetitividade, esforço e posto de trabalho inadequado. As partes do corpo mais acometidas são região inferior e superior das costas, pescoço, ombros, pernas. Diante disso, faz-se necessária a realização de mudanças urgentes no posto de trabalho a fim de cumprir o que diz a NR 17 e melhorar o ambiente de trabalho do operador de checkout, minimizando os riscos de LER/DORT e a implantação da ginástica laboral.

**Palavras-chave:** Ergonomia; Análise ergonômica de trabalho; Organização do trabalho; Qualidade de vida no trabalho.

## 1 Introduction

The word ergonomics comes from the Greek, where “Ergon” means work and “nomos” means standards, laws, rules. It is a discipline that has a systemic study focused on aspects of human activity (*Ergonomics*

*Association Brazilian – ABERGO*). According to the Associação Internacional de Ergonomia (2000), ergonomics is a scientific study that aims to link the understanding between systems / elements

<sup>1</sup> Departamento de Engenharia de Produção, Faculdade Integrada de Cataguases – FIC, Centro Universitário do Sul de Minas – UNIS, Rua Romualdo Menezes, 701, Menezes, CEP 36773-084, Cataguases, MG, Brazil, e-mail: josisouzakta@hotmail.com

<sup>2</sup> Programa de Pós-graduação em Exercício e Esporte, Universidade Federal de Juiz de Fora – UFJF, Rua José Lourenço Kelmer, s/n, Martelos, CEP 36036-330, Juiz de Fora, MG, Brazil, e-mail: personalmau@hotmail.com

and humans through the application of principles, theories, data and methods to projects with order to improve the overall system performance, satisfaction and well-being of human beings.

Ergonomics is governed by Regulatory Standard 17 (NR 17 - Publication: GM Ordinance No. 3214 of 08 June 1978, D.O.U. 07/06/78) (Brasil, 2007b). This standard establishes parameters to suit the working environment psychophysiological conditions of the worker, offering comfort, self-esteem and efficient performance.

The ergonomist aims to contribute to the good project planning, work stations, assessment tasks and environments so they are tailored according to the capabilities, needs and limitations of the human being (Associação Internacional de Ergonomia, 2000). But in many cases the materials, furnishings are unplanned required form or are not adapted to humans. As an example we can mention the checkouts of supermarkets, in which the securities have formats and standardized measures, not taking into account the different individual anthropometric characteristics of the operators (Semensato, 2011).

The supermarket sector is part of the tertiary sector of the economy, it is characterized by service to the public or the provision of services (Santos, 2004), where checkout operators - or cashiers - perform registration of goods that customers buy they receive payments, give change due, perform the closing sale (Kasper, 1991). The amount, diversity and frequency of tasks that the cashier performs has high intensity, which consequently increases the mental and physical burden of operators (Batiz et al., 2009).

According to Moreira et al. (2011) the tasks performed by these professionals are repetitive and stressful, and when they join several other factors such as customer complaints and quality of jobs can result in excessive stress, and even *READ* (*Repetitive Strain Injuries*) and *MSDs* (*Musculoskeletal Diseases related to work*).

In order to promote minimum guidelines and parameters to suit the ergonomics in the checkout operators working conditions, for the safety and prevention of problems relevant health work, was approved by the *SIT Ordinance on 08, 30 March 2007 Annex 1 NR 17* - work of checkout operators (Brasil, 2007a). The obligations are in this annex must be obeyed, and those obligations required in all stores within January 2008 to December 2011.

Since the professional production is directly related to the working conditions in which it is developed, there is the importance of the jobs to be adjusted properly to avoid *RSI / MSDs*, absenteeism, low production, among others that can be harmful to both operators as for entrepreneurs. In this sense,

ergonomics aims to assist in the development of jobs to help reduce biomechanical and cognitive demands of the operator, allowing the adoption of a more appropriate posture (Iida, 2005).

Based on these considerations, this study was conducted in a supermarket located in Cataguases, Minas Gerais, in order to identify the characteristics of the work and the risk factors that checkout operators are exposed through the adopted motions and postures during the implementation of activities, musculoskeletal pains which are most affected, and to evaluate the work stations whether they were in accordance with Annex 1 NR 17.

## 2 Methodology

### 2.1 Sample

This study was characterized as descriptive, exploratory, with qualitative and quantitative approaches and documentation technique was extensive direct.

This study was conducted in a medium sized supermarket, located in the city of Cataguases - Minas Gerais, the sample is composed of 14 of the total of 18 cashiers working at the supermarket, which were available to participate. There was no selection criteria for the research.

### 2.2 Instruments

The first instrument was the "Checkout Operator Professional Research Questionnaire" based on Moreira et al. (2011) model, with closed questions, the objective was to study the characteristics of the sample and the relationship with the duties performed in the exercise of job.

The Rapid Upper Limb Assessment Method (RULA) is carried out through direct observação and aimed to investigate the disturbances of the arms associated with the risk factors to which they are exposed. It was developed by McAtamney & Corlett (1993) at the University of Bottingham, and second Cardoso (2006), this method relates the movements and postures of the neck, trunk, upper limbs with the external load and muscular effort that the individual is subjected.

Another instrument used was Body Diagram (proposed by Corlett & Manenica, 1995), consisting of "bodily discomfort Assessment Scale" in which operators marked regions of the body where more felt pain and intensity, ranging from no intolerable, and "Problems Musculoskeletal" operators reported pain within 30 days and 12 months, and failed to perform some task because of pain related to work in the last 12 months.

The Couto Checklist (Couto, 1995) contains 25 questions on work characteristics such as physical overload, strength hands, posture at work, repetitiveness, organization, among others (Maciel et al., 2012). Through these features it analyzed the degree of risk, ranging from no to high risk of biomechanical factors.

Annex 1 NR 17 was used to check whether the parameters are being complied with according to the terms of the norm.

### 2.3 Procedures

The first procedure was to request a letter of formal authorization to carry out the research at the supermarket, where the objectives and purposes of the research were explained.

Soon after, he was given the Term of Free and Informed Consent Form (ICF) in two copies, becoming one with the other and researched with the researcher. This explained clearly the objectives and work purposes, the importance of the participation of each operator in the survey according to the instructions established by Resolution of the National Health Council (CNS) no466 of December 12, 2012, which disposes of the Guidelines and Regulatory norms Involving Human Subjects (Brasil, 1996, 2013).

The "Checkout Operator Professional Research Questionnaire" and the Body Diagram (Corlett & Manenica, 1995) were delivered together, which could be taken home and returned within 48 hours.

The Rula method (McAtamney & Corlett, 1993) does not include continuous time of operations and the activity of the cashier was split into five stages: 1 - Pass goods by the optical reader or enter the numbers of the barcode (when the player does not identifies the barcode to be torn, wrinkled, wet); 2 - Weigh goods as horti frutti, breads; 3 - Place the goods in space to be packaged; 4 - Packing the goods; 5 - Charge the customer. The analysis was conducted through direct observation, defining the evaluation of 150 positions for each step, as there is no minimum number of observed positions. Later the study was conducted the analysis of the results.

To perform the check list of Couto was observed the characteristics of the physical overload work force with hands, posture at work, etc.

### 2.4 Statistics

For data analysis was performed using Excel software Microsoft 2007 with functions of descriptive statistics such as percentage, mean, standard deviation, tables. To the level of significance was considered  $p < 0.05$ .

## 3 Results and discussion

### 3.1 Professional Research Questionnaire Checkout Operator

The first tool used was the Professional Research Questionnaire Checkout Operator (adapted from Moreira et al., 2011) that aimed to check the characteristics of the sample and its relation to the functions performed in the work.

The participation of cashiers was 77.78% of the total working in the supermarket, and 93% were females and 7% were male.

The age of the cashiers ranged between 20 and 40 years ( $27.79 \pm 7.16$ ). Parallel results were authors like Sodr e et al. (2011), in which age ranged between 28 and 43 years, since Trelha et al. (2002), ages ranged between 18 and 56 years. Liedke (2001) pointed out the predominance of young people aged between 18 and 24 in the trade sector because most of these have their first job in this sector, and does not require technical expertise in large scale.

Regarding marital status of employees, 53.33% are single and 46.67% are married. Of the total only 33.33% have children, where these 60.00% have children and are married and 40.00% have children and are single.

The predominance of female characteristics, young age and unmarried prevail in functions such as checkout operators were found in other studies as Carlos et al. (2012), Trelha et al. (2002), Mackay (2000), Diniz & Ferreira (1998) .

Netto & Luz (2011) conducted a survey in Brazil in a hypermarket of US origin on female participation in the job market through the cashier activity and observed that the female sex is predominant in the areas of cash registers and parking, control boxes, cleaning, bakery and checkout operator attendants. In the latter are closely vacancies reserved for leaders of trade unions to women, in addition to being a strategic issue. Some of the reasons would be the facility to perform these types of tasks / work, serve the public docile and calm way, without aggression in case of rough situation, and support the accumulation of activities and multifunctionality itself.

The anthropometric characteristics as the height of the staff ranged from 1.48 to 1.78 meters ( $1.65 \pm 0.07$  m) and weighed between 56-92 kg ( $69.07 \pm 11.01$  kg). With this data was held the Body Mass Index (BMI), which indicated the classification of operators. According to the reference values WHO (World Health Organization, 2000) obtained BMI ( $25.48 \pm 2.87$  kg / m<sup>2</sup>) showed that the sample was classified as overweight. According to the same author, obesity and overweight pose a constant threat to health since they can cause various

diseases such as stroke, and other heart-related, and to revert methods are needed for the treatment of obesity and diet activity and exercise

Regarding the level of education, 20.00% have 1st Grade Complete, 26.67% have 2nd Grade Incomplete, 46.67% have 2nd Full Degree and 6.67% have higher full.

The operators function of time at this supermarket has averaged  $13.93 \pm 9.9$  months, and 85.91% (12 operators) exercised the function in this supermarket up to two years and 14.29% (2 operators) have more 2 years.

Studies in supermarkets that corroborate this finding is of Teixeira et al. (2009), an average of  $12.17 \pm 11.15$  months and Gonçalves et al. (2011) in which the operators were working about 1 year. Peres (1999) in a survey of the residence time of checkout operator who were laid off between 1995 and August 2000, found that the average time was 9.5 months in the studied supermarket. Thus, it can be suggested that the activity of a checkout operator has high turnover. Battisti et al. (2005) cite the causes that may be linked the consequences acquired by operators when they take the job, already Trelha et al. (2007) and Teixeira et al. (2009) cite the inadequacy of jobs to the characteristics worker be one of the factors that lead to high turnover.

According to the Associação Brasileira de Supermercados (2012), the position of cashier leads the turnover rate with 47.2% of turnover, followed by the butcher and deliveries, which recorded respective margins of 25.5% and 13%. According to organizational development consultant, Silvia Osso (2012), this high turnover is due to several factors such as little or no appreciation, no awards, which leads to lack of motivation, lack of career planning, comprehensive workload along with scales on holidays and ends week.

The experience of time in another supermarket checkout operator as ranged from 6 to 24 months ( $16.50 \pm 9.00$  months), in which the total of 44.65% operators have already exercised the function in another supermarket. Rodacki & Vieira (2010) found that the average time experience as a checkout operator is  $10.1 \pm 2.6$  months. Liedke (2001) reports that trade is not as demanding in a matter of past experience, which proves the fact that research presented years of low experience.

The overtime is performed by 13.33% of employees, 26.67% reported performing overtime at times, and only 6.67% have some other kind of paid work.

Training is done through a tax or an experienced cashier, where the newcomer receives instructions for a few days as the procedures to be performed in the cashier function and other questions that arise. Of the total, 86.67% said they had training, while

13.33% did not consider it to be a training because they believe it should last longer or be more specific.

A study by ABRAS (Associação Brasileira de Supermercados, 2010) showed that the supermarket sector provides training in the same proportion to the operational and management levels. Of the total sample, the training offered at the operational level are made by 79% of supermarkets and 83% of the overall market, so it is a difference of 4%, which means that supermarkets are emphasizing the importance of training for improvement of the operators.

All cashiers, ie 100% reported performing breaks to go to the toilet or drink water, which are allowed in the supermarket at any time provided that the employee does not leave the device in the middle of a call, and the flow customers is low. Other breaks are made for lunch and coffee in there 15 minutes reserved.

With time they intended to remain in function, 100% did not know if will remain the cashier, where the reasons for not exercising the function are 53.33% do not know which abandon reason, 13.33% want to study, 13.33% want to get another job, 20% claim to have reasons other than the options offered to leave the function. The research confirms the found here are the authors' Moreira et al. (2011) in which nearly 60% did not know how long wanted to stay in the role, while 20% of operators said that at most in a year would leave the function in that the reasons were not discussed.

The positions taken by cashiers are that 46.67% prefer to work more and sitting less standing, 33.33% work always sitting, 13.37% work less sitting and more standing and 7.67% are always working on foot. However, only 33% regulate the seat when changing location, so 66.67% declare that regulate the seat, which can cause biomechanical problems.

However, not regular justification seat is that not all have height adjustments, which is outside of the requirements of Annex 1 of NR 17, in which one should keep a chair of adjustable work to the stature of the worker and the nature task. It should also be the seat and backrest lumbar support with appropriate density padding (and 2.1), as well as adequate space for placement of the chair and moving the operator to enable alternation between standing and sitting work (2.1 d).

Regarding health, physical activity performed by cashiers out of the working day is only 26.67%, this can be explained by the fact that the supermarket does not have any program to encourage physical activity, or gymnastics labor within the company be offered. Of those who reported receiving exercise, the frequency is 25% practice once a week, 50% practice 3 times a week and 25% practice 5 times

a week, where the types of popular activities are: cycling (25%) and walking (75%). Teixeira et al. (2009) reported that physical activity is performed only by 31.25% of the operators and are also not exercised within the company, among the modalities are to hiking, biking, weight training. Since the frequency during the week ranged from 40% practice 7 times, 5 times practice% 7, 13% practice 3 times, 2 times practice 7%, 7% practice 1 time per week.

The explanation of most of the non-exercise physical activity operators would be the lack of time, since after the working day there are household chores to be done. (Moreira et al., 2011; Battisti et al., 2005).

Of the total 53.33% surveyed operators reported feeling pain during and outside of the journey and 20% admitted feeling pain only during working hours, so a total of 73.33% said they felt pain during the working day and of these 87, 50% believe that the pain is caused by work.

The frequency to the doctor is done by 40% of operators, where these 66.67% go 1 time per month and 33.33% go 2 times a month to the doctor. But the use of drugs in relation to the musculoskeletal pain is done by 13.33% of total operators, where the same 50% reported drug use 2 times a week and 50% makes use of all medications days (4 times a week or more).

### 3.2 Method Rapid Upper Limb Assessment (Rula method - McAtamney & Corlett, 1993)

By Rula method (McAtamney & Corlett, 1993) there was the observation and analysis of the movement of the upper limbs of cashiers in each activity in which they were divided, and Rula was identified activities that offer higher risks of musculoskeletal injuries and the level of action required for each activity.

Table 1 shows the activities of the cashiers and the level of action. The action level 2 excelled other levels, which implies the need for more detailed investigation of activities. However, when added levels 3 (investigate and change quickly) and 4 (change immediately), it was realized that the needs of

more urgent measures are the activities 5 (43.20%), activity 2 (42.40%) and activity 1 (40.80%), since the activities with acceptable positions are not repeated for a long time and can change (and level 1 and 2) were the activities 3 (64.00%) and 4 (63.2%), since these activities require efforts on smaller impacts of the arms in relation to other activities.

Results Batiz et al. (2009) comes against this study, in which the activities that need more urgent are: passage of goods by optical reader (47.4%) and the charge to the customer (33.9%), in which the reasons are due to the fact that the furniture be inappropriate anthropometric characteristics, poor posture, lack of breaks. The same happens in this study, with the exception of breaks that are allowed when customer traffic is not heavy.

Piccinini et al. (2009) in their study also in a supermarket, found the level 4 (investigate and change immediately), in which the reasons corroborate the research, the need for a conveyor belt, change the optical scanner and monitor, and replace the rotating chairs.

When studied in greater detail the working environment becomes clear risks of activities which operators are exposed. Checkout is not composed of electro-mechanical treadmill, so operators have to reach out to bring the goods to join them. Then the passage of goods, there is the lifting of the arms as the optical reader is a little higher than the modern, and perform the rotation and flexion of the wrist according to the characteristics of each product such as weight, size, shape. The balance is located left of the operator and level, which in turn requires the operator to twist the trunk and neck and lift the arms and shoulders during the weighing of goods. The same occurs to charge the customer, since the cash register is also located to the left and is just below the scale, thus having also to tilt the neck and torso. As for the activities to put the goods to pack and package them, the operators have to tilt the trunk at times.

Low-mass products in large volume can contribute to a high number of abductions and crunches (Vieira & Morelli, 2000), which in turn can lead to RSI / MSDs, so there is importance of balance is

**Table 1.** Results of the analysis Rula method with their Action Levels of each activity that the checkout operator performs.

<i>Action</i>	<i>Activity level</i>			
	<i>Level 1</i>	<i>Level 2</i>	<i>Level 3</i>	<i>Level 4</i>
1. Pass the goods by the optical reader or typing the bar code numbers	10.40%	48.80%	29.60%	11.20%
2. Weigh goods as horti frutti, breads	6.40%	51.20%	30.40%	12.00%
3. Place the goods in space to be packaged	17.60%	46.40%	26.40%	9.60%
4. Packing goods	18.40%	44.80%	28.80%	8.00%
5. Charge the customer	9.60%	47.20%	32.80%	10.40%

located in front of the checkout operator as Annex 1 to NR - 17.

According to Annex 1 of NR - 17 workstation must have system with treadmill electromechanical (2.1 g); there should be alternative forms of presentation of the goods barcode to the optical reader (3.1 c); the balance must be flush with the checkout, and close the front of the cashier (3.4 a, b) and up to 8 digits by commodity code (and 3.4).

So we realize that the checkout does not meet the anthropometric measures as set out in Annex 1 of NR 17, in which the job must meet the anthropometric characteristics of 90% of the operators, in addition to respecting the scope of the upper limbs and vision thus compatible with the view manipulation (2.1 a, c).

The exchange of a conventional checkout remodeled by a variety of benefits for the operator, because it has lower risk of injury when compared to the usual, with reductions in amplitude and slope side anterior trunk (Vieira, 2004).

The supermarket consistent with regard to the packaging of goods, as also in accordance with Annex 1, the packaging of the goods should not be routine work cycle of the operator, since they are required at least three baggers for each checkout. When the flow of customers is high in the studied supermarket, there is a bagger for each checkout, streamlining the service and preventing wear of operators and future consequences.

It analyzed what type of payment that more can affect the upper limbs of the operators. And only 8% of the total sample paid by check, 33.60% paid with cash, 58.40% with card, in which these only 31.51% passed the card itself and 68.49% handed his card to the operator to perform the passage thereof may be suggested that this is due to lack of experience on the part of consumers, since the card is a payment which is still growing.

Thus it was concluded that the posture more required by the operator for payment is the passage of the card by itself (level 3 = 56.25%), in which it has to raise the arm above the shoulders, because the equipment is found high, with the intention of facilitating the client. Soon after comes the money (level 2 = 45.24%), where there is need to tilt the trunk and neck to make the payment. Therefore there is the need to change immediately the cash register, so that cashiers will not develop musculoskeletal disorders. Since the last card by the operator (level 1 = 64.00%) the check (level 1 = 50.00%) are acceptable if not repeated for a long period of time.

The Rula method (McAtamney & Corlett, 1993) can be applied in different sectors, financial sector 80% of employees required immediate changes due to postures of cervical, wrist and lower limbs (Ferreira et al., 2009).

Already in an automobile industry, Serranheira & Uva (2010) applied the Rula method in 71 jobs, and found 45 jobs with reduced risk (levels 1, 2, 3 and 4), 19 posts to investigate and change urgently (levels 5 and 6) and 7 posts would have to be changed urgently (level 7). Where application of force and repeatability are the main risks that employees are exposed.

Martínez et al. (2012) conducted a study on students of a school of dentistry, and the results showed that during the practical sessions 43.1% (level 4) of the positions taken by students need urgent changes on the desktop and 34, 8% (level 3) postures require rapid changes due to the same postures are maintained for long periods of time.

In a footwear company, 96% of employees were at level 3 or 4 and only 4% in level 2. As the prevalence of pain in 80% of employees and the sector most at risk of MSDs was the assembly due to the repetitiveness (Lourinho et al., 2011).

Through these studies it is clear that the stance adopted by each professional will determine the level of risk, in which most of the time the repetitiveness, postures held for long periods of time and force application are the main risks to RSI complications / MSDs. Being handles / hands, torso and legs most affected by these risks.

### 3.3 Body diagram (Corlett & Manenica, 1995)

Through-body diagram (Corlett & Manenica, 1995), which is composed of "bodily discomfort Assessment Scale" and "Problems Musculoskeletal", he studied the body regions to the most Pain, operators, or larger incidences of musculoskeletal symptoms in the regions of the body.

Through "Problems Musculoskeletal" examined the prevalence of musculoskeletal pain in cashiers in the last 30 days and 12 months, the departures daily tasks because of these pains in the last 12 months. Table 2 shows that in the last 12 months the body region that felt more pain operators was the head (86.67%), but only 13.33% of the operators failed to perform tasks at work, leisure and home. One explanation would be the stress to which they are subject. Melo & Rodrigues (2005) state that the functions of the cashier create working conditions that contribute to the formation of stress.

Another factor that may lead to increased physical and mental burden is the introduction of the optical reader, also known as a scanner. In the search for competitiveness and faster service, optical readers are deployed, streamlining the process, however cause greater pressure on cash operator and a cost to your health as RSI (Carrasco et al., 1995).

The authors Rinaldi et al. (2009) conducted a survey in order to analyze reasons for which customers go to

**Table 2.** Musculoskeletal problems in the last 12 months sick leave in 12 months and musculoskeletal problems in the last 30 days.

<i>Body regions</i>	<i>Last 30 days (%)</i>	<i>Last 12 months (%)</i>	<i>Pitch in the last 12 months (%)</i>
Head	60.00%	86.67%	13.33%
Eyes	43.75%	40.00%	0.00%
Neck	60.00%	53.33%	13.33%
Shoulders	73.33%	66.67%	0.00%
Elbows	0.00%	0.00%	0.00%
Fist/Hands	46.67%	46.67%	6.67%
Back upper	53.33%	53.33%	20.00%
Back lower	66.67%	60.00%	6.67%
Hip/Buttock	26.67%	46.7%	0.00%
One or both thighs	20.00%	26.67%	0.00%
One or both legs	47.00%	53.33%	33.33%

a supermarket. Among the reasons such as location of the property, service quality, product price, speed of service, product variety, parking, among others, fast service stood out in relation to other reasons, being relevant to customers. Thus, the search for faster and more efficient service, checkout operators end up feeling pressured because of the time in order not to let form large queues, resulting in an accelerated pace (Trelha et al., 2007).

Other body regions most affected in the last 12 months were the shoulders (66.67%), neck (53.33%), upper coast (53.33%) and one or both legs (53.33%). As for the areas of the body that made the operators ceased to perform their daily tasks in this period were: one or both legs (33.33%), upper coast (20.00%), head and neck (13.33%), lower coast and wrists / hands (6.67%).

These headaches may be related to irregularities in the job as lack footrest, high monitor, not suitable checkout, which means that there is repetitive efforts to get merchandise, weigh them, pass the optical reader and enter codes. Reasons that corroborate França & Aguiar (2010).

As for the regions that caused departures in the last 12 months in the operators were wrists / hands / fingers (32.9%), followed by arms (30.1%) and lower back (26.0%).

In a public company part of the body is dominated by pain are: lumbar spine (40.3%), cervical spine (27.3%) and shoulders (23.8%) (Vitta et al., 2012).

Professions like banking also suffer from pain in the dorsal and lumbar column (41.67%), wrists and hands (33.33%) and shoulders and neck (25.00%) (Silva et al., 2013). Similar to that found by Pinheiro et al. (2002), which were the shoulders (50.6%), neck (48.1%) and wrists, hands, fingers (44.2%), being caused by departures shoulders (18.2%), neck (16.2%) and lumbar (15.6%).

Despite the pain areas of the body are not similar in some comparative studies, it is noteworthy that the pain is manifested mainly on the shoulders, upper limbs and neck. Thus it is observed that these professions resemble the cashier, as they have to remain seated for long periods, having different postures that can affect the upper limbs and consequently sick leave and daily tasks.

The pains of the last 30 days when compared to the past 12 months increased in the regions of the neck and lower coast (+ 6.67%), shoulders (+ 6.66%) and eyes (+ 3.75%), and pain in wrists / hands and upper coast did not change.

Several factors lead cashiers to feel intense pain in these regions, such as the monitor height is high, requiring eye strain, checkout design is inadequate, there is also the need for a footrest. What according to Annex I of NR-17 should have this support, regardless of the chair and adopted a system with electro-mechanical treadmill in each job in checkouts with length of 2.70 m or more.

All operators said they did not feel pain in the elbows (100%), which corroborates with the findings in the study of Machado et al. (2012), in which no bank felt considerable pain in this region of the body. Thus it suggests that these professionals are not amenable to epicondylitis, which are problems which occur on the elbows.

Through bodily discomfort Assessment Scale, which can study the intensity of discomfort / pain body that the cashier is subjected, being evaluated the trunk, left and right side.

Table 3 shows the body part to which belong to the trunk and the intensity of each body part / trunk. Trunk intolerable pain were recorded, however the body regions where operators feel enough pain is the cervical region (60,00%), neck (46.67%), lower coast (27.27%).

Through body discomfort Assessment Scale it was also possible to study the intensity of pain in the case of operators in relation to the left and right side. Graph 1 shows the difference between the left and the right side in each body part of the operators. None of them declared feel intolerable pain, but feel quite shoulder pain, wrist, hand, thigh and leg, in which the left side is more damaged than the right side in the regions of shoulders (26.67%), thigh (33, 33%), arm (20,00%), forearm (73.33%) and cuffs (13.33%). What explains the fact of goods,

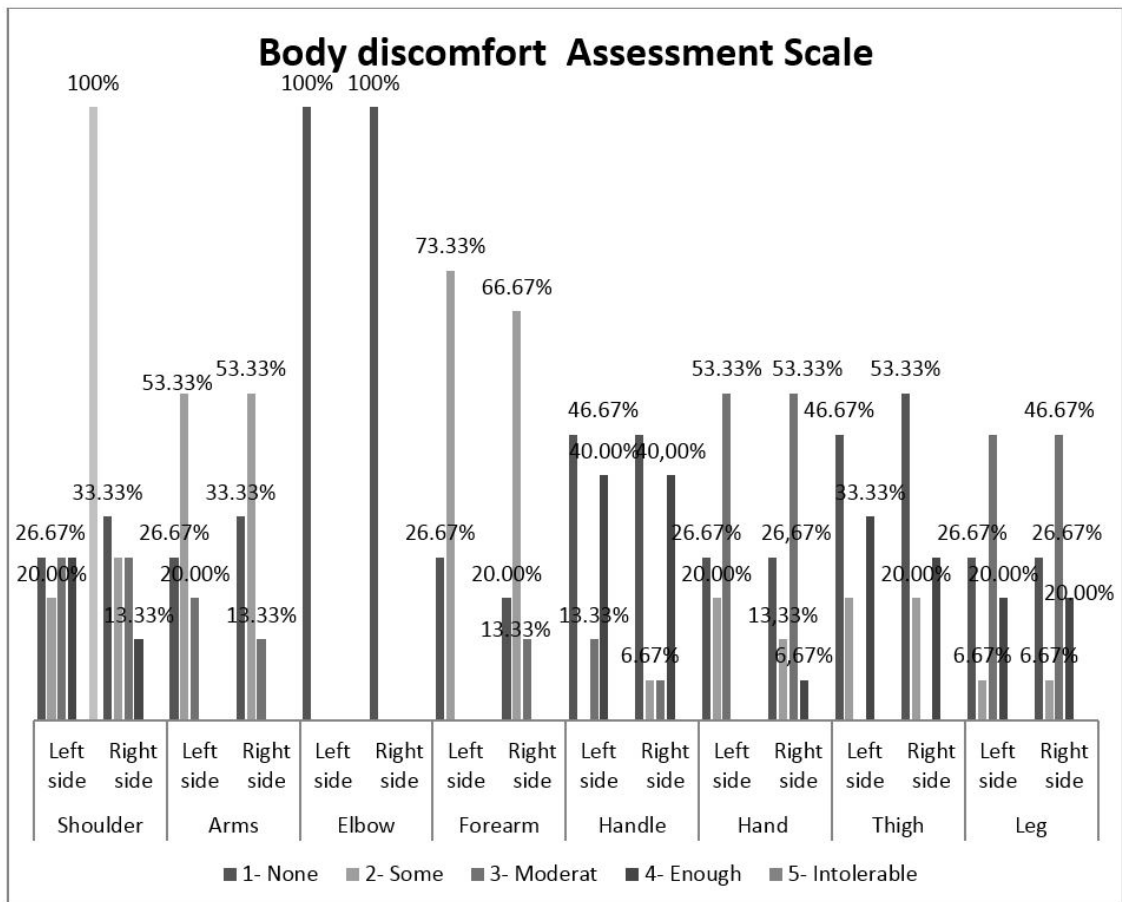
scales and cash register are located to the left of the operator.

A similar result to that of França & Aguiar (2010) stating that the past 12 months the regions that operators always feel pains are wrists / hands / fingers (34.7%), followed by dorsal and arm (23.6%). And the region with the lowest pain index was the elbows. The explanation for the pain in these regions may be linked to poor posture and static position, and concentration movements.

The most intense complaints in the bank who do not practice exercises are left and right shoulder

**Table 3.** Body discomfort Rating scale: pain intensity score over the parts belonging to the trunk.

Part Body / Trunk	Intensity Grade				
	1- None	2- Some	3- Moderat	4- Enough	5- Intolerable
Neck	26.67%	13.33%	13.33%	46.67%	0.00%
Cervical Region	20.00%	6.67%	13.33%	60.00%	0.00%
Back upper	33.33%	20.00%	26.67%	20.00%	0.00%
Back Average	13.33%	26.67%	33.33%	26.67%	0.00%
Back lower	27.27%	9.09%	36.36%	27.27%	0.00%
Bowl	20.00%	13.33%	40.00%	26.67%	0.00%



**Graph 1.** body discomfort Assessment Scale - intensity degree of pain on the right and left in relation to body parts.



(28.57%). When complaints are moderate left side stands the right side in the regions of the arms (28,57%), forearm (14.29%) and wrist (Machado et al., 2012). So it can be suggested that the profession of a bank has similarity to a cashier, may suffer the same consequences as RSI / MSDs.

The fact that operators fail to carry out their activities in the last 12 months can be linked to the intensity of pain in regions of the body. In the trunk, the neck is the region markedly impaired in 46.67% of the operators, which made 13.33% depart from their daily tasks. The legs that caused 33.33% of sick leave have as to moderate pain (46.67%), both left and right, and cuffs are affected with severe pain (40%) and caused 6.67% of sick leave. Although 33.33% did not feel any pain in the upper coast, 66.667% feel pain (some, moderate, rather), which caused 20% of sick leave.

You can report the intensity of pain with the contents of operators who failed to perform everyday tasks in the last 12 months. The neck made 13.33% of operators depart tasks due 46.67% feel enough pain in the neck.

### 3.4 Couto checklist (Couto, 1995)

The checklist, prepared by Couto (1995) allowed through the ergonomics evaluation of the upper limbs, that score was obtained equal to 13, which the criterion of interpretation showed that the profession checkout operator is a significant biomechanical factor, or it is a risky profession, may cause RSI / MSDs. This can be explained by the characteristics of the work to which the checkout operators are submitted, they are:

- 1- Posture at work: is related to the need to raise the arms above the shoulders to make the passage of the card during the passage of goods the cashiers have to perform different movements with the wrist according to the shape of the product (rotation, flexion / extension), and standing postures when the pace of work is heavy, stem rotation;
- 2- Force hands: there is constant need for manual effort because of having to handle products with different weights and shapes, and repetitive;
- 3- The physical strain, the repetitiveness and organization at work: it can be clarified by the fact that the balance be positioned left, the requirement of customers in line for fast service, and the accumulation of tasks.

Ballardin et al. (2005) used the checklist and have obtained a score 12 to 13 points, in which problems were also related to physical overload and repetitiveness, adopted postures, job, force applied to the hands, which are similar to those found, showing that the activity of the cashier needs attention. It is also classified as high risk for the development of RSI, according to studies demonstrated the United States and Europe (Shinnar et al., 2004; Ryan, 1989). Therefore we see the need for constant studies and analyzes in order to improve the professional working environment avoiding health problems consequently removals and losses to the employer.

Soares & Silva (2012) in a study of a mining company in a job to the computer pointed to a reasonable ergonomic performance. Already in a consumer electronics industry (Coelho & Alves, 2012) and a forest nursery (Maciel et al., 2012) the biomechanical factor is significant. What can you suggest that jobs that require great effort with senior members offer risks directly linked to the origin of RSI / MSDs, and that therefore mean that there is the absence from work and health complications. What is needed is that the company becomes aware of the necessary changes in job checkout operator and make these changes, benefiting and preventing future consequences.

## 4 Study limitations

During the execution of the study there were limitations that prevented it was further and studied in greater detail, these limitations are related to the involvement of checkout operators, it was not possible to study the ergonomic features of all supermarket operators, need for studies aimed at Rula method in supermarkets and studies on pain in the last 30 days - in Body Diagram (Corlett & Manenica, 1995).

In the supermarket cashiers work 18, however 14 (77.78%) operators participated. Even with the Consent and Informed explaining the objectives and purposes of the research, the importance of participation of operators, 4 (26.77%) did not participate for reasons unstated and delivery after the deadline of 48 hours. It would be important if everyone had participated to further deepen the study of all checkout operators.

The need for studies aimed at Rula method in supermarkets was another limit to the study, which found only two studies to compare the results, which meant that there was a more comprehensive comparison between different supermarkets.

Comparing studies on pain in the last 30 days - in Body Diagram - were not found related studies to present pain in the last 30 days, only we found in the last 7 days, which prevented further comparison.

## 5 Conclusion

This study along compared to related studies have shown that the profession checkout operator has high turnover, this occurs due to factors relevant to furniture, risk activities and postures that can cause RSI / MSDs, and consequently sick leave and daily tasks. Therefore, there is a need breaks during work and physical activities, however not all operators have available time to perform, thereby generates the importance of deploying the supermarket gymnastics for employees, which in turn will result in increased productivity, lower stress index and injuries, better relationships with customers.

The body mass index obtained showed that the sample is classified as overweight, which leads to another reason to introduce gymnastics in order to avoid serious health risks such as heart problems, severe obesity, diabetes.

Pain during working hours were reported by 73.33% of the sample, where these 87.50% declared that the reasons are related to work, but only 40.00% said that they go to the doctor and make 13.33% use of drugs, which suggested that the activities performed by the cashier offers health risks and damage them.

By Rula method (McAtamney & Corlett, 1993) it identified the activities that need further investigation and changes urgently. And that consequently are those that most affect the upper limbs of employees, which are: the passage of goods through the optical reader or entering numbers of bar code, the weighing of goods as horti frutti, breads and customer billing activity. As these activities that will require operators with irregular postures, abduction and elevation of the shoulder, trunk rotation and wrist / hands, and trunk inclination and neck.

Therefore, it is suggested that the activities are related to pain body regions (conducted with the Body Diagram - Corlett & Manenica, 1995) that operators reported musculoskeletal pain, which were legs, shoulders, lower back, upper coast and the neck. The latter being and legs, body parts those caused operators ceased to perform their daily tasks. When related to the intensity of pain in regions of the body, no operator said he felt intolerable pain, however, most feel quite pain in the trunk in the neck, neck, lower coast.

The side of the body, the left stands right in the regions of the shoulders, thigh, arm, forearm and wrists where the pains are classified as well. This can be explained by the scales and cash register are located left of the operator, besides the effort to be applied to make the products pass the optical reader.

Through Couto checklist have been identified risks that operators are exposed during their daily

activities in the supermarket, which are: posture at work, strength hands, physical overload, the repetitiveness and organization at work. They constituted as the main responsible for providing significant biomechanical factor of risk and may cause RSI / MSDs.

Another damaging factor for the cashier is the inadequacy of jobs as the checkout does not meet 90% of the anthropometric characteristics of the operators, as is provided in Annex 1 of NR - 17, which involves the exchange by a new model. According to Annex 1 of NR 17, the the chairs should be adjustable to the worker's height and nature of the task, there must also be the seat and backrest for lumbar support, padding of appropriate density, and enough space to allow alternations between work standing and sitting. Moreover, the job must provide alternative forms of presentation of the goods barcode to the optical reader; the balance must is flush with the checkout, and close the front of the cashier and maximum number of 8 digits for commodity code, adopt system with electro-mechanical treadmill in each job in checkouts with length of 2.70 m or more and there should be support for the independent chair legs.

Finally, we can report the contribution of this study as a way to indicate the changes needed to prevent occupational risks that operators of this supermarket are subject, where risks can cause musculoskeletal symptoms, absenteeism, stress, depression and other health problems .

The ergonomics contribution to study the relationship between machine and man in order to make decisions that benefit the health and safety professional becomes important to study in the field of Production Engineering, which suggests both ergonomic measures regarding improvements in production systems with results that benefit the quality and productivity of the activities performed.

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