



Analysis of occupational accidents and musculoskeletal system problems of butchers in Hatay

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Abstract

Although musculoskeletal system injuries are frequently seen in the area of meat industry, studies on this topic are insufficient. The purpose of this study it to identify the occupational accidents and musculoskeletal problems of butcher shop workers in the city of Hatay. A survey consisting of 32 questions was given to 69 butchers who work in the city of Hatay with 38.20±1.32 in a face-to-face interview. Their social status, activities in the butcher shop, past injuries and activities after their injuries were questioned with the survey. It was determined that the butchers were most frequently injured in their hand and finger area (60.9%). It was determined that 40.6% of the butchers had an accident in the last 5 years; their injuries were mostly non-dominant hand injuries and infections were seen in 15.9% of the butchers after their injuries. It was found that the most frequent injuries took place during the hanging of carcasses; carelessness played an important role in getting injured; use of sharp tools led to injuries in 97.1% of the butchers and that 2.9% of the butchers were left with permanent handicaps after their injuries. It was determined that hand-finger injuries and back pain complaints were frequently seen in butcher shop workers and that they do not use any protective equipment to avoid injuries. Therefore, it was concluded that the necessary analyses need to be done on the butcher shop workers and that training should be provided for them on protective precautions and posture problems.

Keywords: butchers, musculoskeletal problems, industrial injuries, injury

1. Introduction

Musculoskeletal system impairments related to work life or occupations are regarded as a serious laborer health problem throughout the world (Mukhopadhyay and Khan, 2015). Besides bad and inappropriate work order or tools which are not ergonomic, long-term work which physically push the human body are accepted as risk factors for musculoskeletal system impairments. Since these risk factors in question reduce the productivity of workers, decrease work quality and cause economic loss besides giving rise to health problems, they are considered as important factors (Colombini and Occhipinti, 2006; Mukhopadhyay and Khan, 2015). According to the data of American National Electronic Injury Surveillance System Center, 1 million patients each year are reported due to occupational accidents (Dianat et al., 2012). In England, this number is 700 thousand people (Valero et al., 2016). Similarly, it is stated in the annual reports of Finland Occupational Health institute, US Labor Department Occupational Safety Health Administration and Canada occupational Health Safety Center that occupational accidents cause serious economic losses. In addition, it is indicated that they cause loss of labor and subsequently decrease in productivity (Gomez Galan et al., 2017). The first three injuries are waist, back and hand injuries

(Dianat et al., 2012; Valero et al., 2016). Occupational injuries take place in many different industries. One of these is the meat industry and it is a highly risky and traumatic area in terms of the injuries workers of this industry face. In a study, it is emphasized that the dimensions and severity of injuries in this sector related to the use of knives, saws and machines have changed (Göçmen, 2016). While some of the hand injuries can be treated with simple medical dressings, others cause deformities in the extremities and even amputations (Dianat et al., 2012; CHIWO, 2013). The high severity level of the injuries delays going back to work and causes personal, social and psychological traumas (Çakır et al., 2014). In a study carried out in England, it was underlined that these types of injuries cause 7.5 million work days to be lost each year (Valero et al., 2016).

The workers' impairment of health and loss of work days do not only affect their well-being and quality of life, but damages the country economy as well. Musculoskeletal System problems caused by accidents impair soft tissue functions such as muscle, joint, tendon and circulatory systems and trigger pain (Valero et al., 2016, Gomez Galan et al., 2017).

When evaluated within the scope of meat industry, besides posture of the workers and carrying things, activities such as lifting or carrying loads, use of sharp tools such as knives leads to such effects (Dianat et al., 2012; Gomez Galan et al., 2017).

Our hands which are extremely important in our daily life have a sensitive and complex structure in terms of anatomical structure such as veins, nerves and tendons. In hand traumas, recovery after losing anatomical and physiological function can take months (Zhu et al., 2017). Hand injuries and fingertip amputations are frequently seen in particular among workers who use powerful cutting equipment. In addition, infections in the injury area can be seen after injuries. Studies have shown that hand injuries are frequent in the meat industry and that an important part of the injuries cause permanent damages (Rubin et al., 2007). Especially the inappropriate work place of manual meat cutters, use of bad work equipment and long working hours are stated to cause risks in terms of musculoskeletal system impairments (Mukhopadhyay and Khan, 2015; Karlton et al., 2016). In addition, it has been reported that besides the spread of meat integrated facilities in the last decade in Europe and carrying of meat manually are serious risk factors (Göçmen, 2016). It is stated that traumas which can take place both during cutting and carrying can be reduced with ergonomic arrangements and training. Within this scope, it is apparent that the characteristics of cutting and carrying tools, appropriate holding positions and use of protective equipment will play an efficient role in the regulation of working conditions (Göçmen, 2016; Tirlon et al., 2019). Although musculoskeletal system injuries take place in the area of meat industry, there are no studies of national scope. It is known that the education level of butchers working in the city of Hatay is generally low and that their carcass cutting and selling methods are different from each other (Sarıgöz, 2010). The purpose of this study is to identify the occupational accidents and musculoskeletal problems of butcher shop workers in the city of Hatay.

2. Materials and methods

This study was carried out through a survey given to 69 butchers and butcher shop workers who work in the city of Hatay and its districts with a face-to-face interview. The ethical committee approval of our study was given by Hatay Mustafa Kemal University Social and Human Sciences Scientific Research and Publication Ethics Committee (02.05.2019/07). In the 32 question survey prepared within the scope of the study, the butchers' social status, activities in the butcher shop, past injuries and activities after their injuries were questioned. The data obtained in the survey were analyzed with SPSS Statistics 17 software.

3. Results

The data obtained as a result of the study on the social structures of the butchers are given in Table 1. It was determined that the age average of the butchers was 38.20±1.32 and the least seen age group was 36-40. It was

determined that most of their mothers were housewives; the butchers mostly continued their fathers' occupation and that their previous job was the same. It was seen that about 90% of the butchers had social security (Table 1).

Table 1. The demographic data and socio-cultural status of the subjects (%)

Age		Mother's occupation	
17-20	2.8	Housewife	79.7
21-25	5.7	Farmer	15.9
26-30	18.8	Retired	2.9
31-35	12.9	Husbandry	1.4
36-40	24.5	Father's occupation	
41-45	14.5	Butcher	40.6
46-50	8.5	Civil servant	20.3
51+	11.3	Self-employed	11.6
Number of siblings		Construction w	4.3
3 and below	18.8	Retired	4.3
4	18.8	Unemployed	4.3
5	15.9	Other	14.6
6	13.0	Education level	
7	8.7	Primary	37.7
8	13.0	Middle-school	34.8
	11.6	High-school	21.7
Occupation before being a butcher		University	4.3
Butcher	44.9	Not literate	1.4
Unemployed	18.8	Social Security	
Other	36.3	Yes	89.9
		No	10.1
Occupational injuries before becoming a butcher			
Yes	43.5	No	56.5

In Table 2, the animals cut by the butchers and the work and processes they perform after the meat cutting process are shown. As it can be seen from the table, butchers who work in the Hatay area mostly cut cattle. The type of animal cut also influences the fact that generally vehicles are used to carry carcasses (%85.5). The number of animals cut daily or weekly is related to the work load of the butchers.

Table 2. Type of animal cut and the use of vehicles in carrying carcass

Type of animal cut		Use of vehicles in carrying carcass	
Cattle	50.7	Yes	85.5
Sheep and goat	13.0	No	14.5
Both	36.2	Number of meat cut per day	
How many kg carcass can you carry?		1 cattle/week	37.7
10-30	16.7	1-2 sheep/day	17.4
31-50	32.6	5-10 sheep/day	13.0
51-70	38.4	5-10 sheep/week	7.2
70+	12.3	2 calves/week	5.8
		Other	18.9

Table 3 evaluates the environment during meat cutting, the equipment used and places of injuries. 34.8% of the workers stated that their work environment is slippery and 98.6% stated that they wear boots during meat cutting. 36.2% of the workers carry the carcasses with pulleys. Although some injuries take place in the transport of carcasses, the most frequently injured areas were reported as the hand and finger area.

Table 3. Meat cutting environment and use of equipment

Slippery work area		Wearing boots while working	
Yes	34.8	Yes	98.6
No	65.2	No	1.4
Style of carrying cattle carcass		Reason for accident during carcass transport	
Own power	10.1	Narrow corridor	10.1
Hangar system	23.2	Falling down the stairs	7.2
Pulley	36.2	Collision	11.6
Other	30.4	Other	71.1
Injury area			
Shoulder	4.3	Hand and fingers	60.9
Waist	33.3	Other	1.4

The work environments where butcher shop workers carry out their meat preparation and sales after the cutting of meat, the tools-equipment used during work and injury states are presented in Table 4. In this table, processes such as the preference of sharp tools, injury reasons, use of protective gloves were questioned. It was determined that 40.6% of the subjects had an injury in the last five years, these are mostly non-dominant hand injuries and infections were seen after the injury in 15.9% of the workers. It was determined that injuries took place most frequently during hanging carcasses, carelessness played a major role in getting injured and the injuries took place due to use of sharp tools in the rate of 97.1%. The butchers in the study stated that they use mallets while using the mincing machine in the rate of 88.4% and gloves in the rate of 63.8%. It was determined that 15.9% did not use any protective precautions while working. Another important finding of the study is that the most important reason for injuries is carelessness (66.7%).

Table 4. Work environment and injury process

Experience of injury in the last 5 years		Use of mallets while using the mincing machine	
Yes	40.6	Yes	88.4
No	59.4	No	11.6
Infection formation after injury		Injury in the dominant hand	
Yes	15.9	Yes	37.7
No	84.1	No	62.3
Tool maintenance		Reason for injury	
Yes	98.6	Sharp tools	97.1
No	1.4	Mincing machine	1.4
		Animal blow	1.4
Injury area			
During carcass hanging	52.2	Injury period	
During meat chopping	24.6	Week days	48.6
During meat cutting	17.4	Eid Al-Adha	37.0
In the mincing machine	5.8	Weekend	12.4
Reason for injury		Protective precautions during work	
Carelessness	66.7	Use of gloves	63.8
Being tired	13.0	None	15.9
Shaking of the hands	5.8	Boots	8.7
Sleeplessness	4.3	Other	1.4
Irritability	4.3	Gloves and boots	10.1
Other	5.9		

As it can be seen in Table 5, the injuries of the workers generally take place in morning and night hours during the chopping of the meat. While the transfer of the injured workers is done by personal vehicles (91.4%), 4.3 % of the workers stated that they can perform first-aid. The rate of workers who are left with permanent handicaps after injury was determined as 2.9%.

Table 5. Injury period

Permanent handicap after injury	
Yes	2.9
No	97.1
Performing first-aid after injury	
Yes	4.3
No	95.7
Transport to the hospital after injury	
Ambulance	4.3
Private car	91.4
Taxi	4.3
First-aid kit in the work place	
Yes	91.3
No	8.7
Injury hour	
Morning	46.5
Close to end of the shift	47.8
Noon	5.7

4. Discussion

In today’s industrial society, more and faster production is targeted. However, it is important that the injury risks of the workers are identified, the workers are protected and corrective precautions are taken in this process (Dianat et al., 2012; Sarıgöz, 2010). In many different occupation groups, in particular spinal impairments in the waist and neck and hand injuries are reported. However, there are very few studies on how sustainable development is affected by work place safety and health proactivity (Sarıgöz, 2010; Jilcha and Kitaw, 2017).

Publications which deal with occupational accidents and musculoskeletal problems of butchers is limited (Rubin et al., 2007; Sarıgöz, 2010; Mukhopadhyay and Khan, 2015; Göçmen, 2016;) and the rate of injuries is not well determined in medical literature. A study carried out in the US showed that the meat packaging industry carried the highest rate of injury in any industry in 5 consecutive years (Becker et al., 1996). Factors which may increase the risk of acute hand injury are associated with activities such as inaccurate work methods and use of inappropriate equipment, use of an out of the ordinary work method, getting distracted or hurrying. Hand injuries take the 3rd place among all occupational injuries in Holland, Denmark and England (Dianat et al., 2012). It was reported that about 40% of hand and wrist injuries in Denmark are due to work accidents which take place in the production industry. In addition, it was reported in 1986 that more frequent and serious hand and finger injuries compared to the other parts of the body took place among Swedish metal workers (Larson, 1986). Although meat integrated facilities became spread especially in Europe in the last decade, carrying of meat manually increases musculoskeletal system impairments (Warriner et al.,

2002). Sarıgöz et. al (2010) carried out in Turkey, it was reported similar to our study that the education level of butchers in the city of Antakya was low and that their occupational methods are far from carcass classification and chopping standards of EU countries and uncontrolled. In the present study, it was determined that butcher shop workers work on slippery areas, carry meat and heavy carcass loads manually (Table 3) and that there is a relationship between their injury areas and hours spent on meat cutting.

According to Evtushenko's study in Ukraine which covered a period from 2003 to 2013, the meat industry is one of the riskiest and most traumatic industries in terms of occupational accidents workers experience (Göçmen, 2016). The scale and the severity of the injuries are determined by the use of knives, saws and the moving parts of the machines (Göçmen, 2016; Karlun et al., 2016). While some of the hand injuries can be treated with simple medical dressings, others cause deformities in the extremities and even amputations. The findings show that meat packaging leads to serious functional losses in the hands and fingers (Becker et al., 1996). The subjects in our study expressed that injuries take place due to carelessness and tiredness (Table 4). It was seen that injury times are morning and night hours (Table 5). It was observed that sharp tools caused injuries in the rate of 90% and hand and finger traumas in the rate of 60%.

The high severity level of the injuries delays going back to work and causes personal, social and psychological traumas (Çakır et al., 2014). It was observed in our study that the butcher shop workers experienced hand-finger injuries the most and backaches afterwards (Table 3). In the literature, it has been indicated that when appropriate hand protection goods and gloves are used to prevent hand and finger injuries, the risk of injury will be reduced (Irmanska and Tokarski, 2017) and infections will be prevented (Rubin et al., 2007). However, it was determined that butchers do not use butcher gloves or protective equipment against accidents in the city of Hatay. In the butcher occupation, the frequency of repeated technical procedures is associated with postural risk, ergonomic conditions, carpal tunnel syndrome prevalence and hand, tendon and spine pathologies (Gherzi et al., 1996). India has implemented ergonomic arrangements to reduce these types of musculoskeletal problems in the area of meat cutting which is a very important source of income for the country. Within this scope, working conditions, postures of the butchers, the repeated movements of the dominant hand and leg movements and injury risks were analyzed (Mukhopadhyay and Khan, 2015; Karlun et al., 2016). In India, butchers work for 7 days a week and 8-10 hours each day. The areas of the body which most get affected have been reported as; upper back (30%), lower back (25%), upper arm (15%), forearm (15%), shoulder (10%) and neck (5%) (Mukhopadhyay and Khan, 2015). In a study carried out by Buzanello et al., the rate of musculoskeletal impairments in butchers in Brazil was reported as 20% (Buzanello and Moro,

2012). When the most common accidents among butchers is analyzed, it can be seen that the fingers are under greatest risk and that these accidents are related to the use of knives (Kaltun et al., 2016; Warriner et al., 2002). It was seen that hand-finger injuries in the rate of 60% in our study population is much higher to the rate found by Buzanello et al. and that 33% rate of waist area problems determined in this study is parallel to the findings of Vogel et al. (2013). It was observed that restaurant business and butcher occupation in the city of Hatay are quite popular in the industry and that injuries are related to heavy work load (Sarıgöz, 2010). It was determined in our study that butchers mostly get injured while hanging carcasses and using sharp tools and generally on weekdays (Table 4).

Musculoskeletal impairments can take place both while cutting meat and carrying meat. After the meat cutting stage, manually carrying the meat causes a high amount of energy loss. In terms of the use of cranes, pulleys etc., although it was predicted that musculoskeletal system injuries will decrease with controlled carrying methods and suitable ground surface characteristics, it was also indicted that this is not valid in all cases (Larsson, 1990). Carcasses which weight over half a ton also cause injuries and musculoskeletal system impairments in butcher shop/slaughter house workers (Göçmen, 2016). Luger et al. (2019) have found low quality evidence in their study that besides regular and hectic work life, duration of work and number of breaks are not effective on musculoskeletal system aches, impairments and tiredness reported by the participants. In addition, important correlations were identified in the study between education level of the workers and the time slice in which injuries take place ($P<0.05$) and area of injury in the body ($P<0.01$), general reasons for injuries (sleeplessness, irritability, etc.) and having social security ($P<0.01$); number of meat cut per day and method of carrying cattle ($P<0.01$) and place/location of injury ($P<0.01$); slippery ground and then time slice in which injuries take place ($P<0.05$) and injury area in the body ($P<0.01$).

The present study showed that musculoskeletal problems in butchers are related to work load and meat cutting technique. It was found that butchers often carry about 50-70 kg of weight exerting body power and that injuries mostly take place during hanging of the carcasses and cutting of meat. It was also observed that work spaces and corridors are narrow and floors are slippery. Another parameter about getting injured is that there is a significant relationship between long working hours and duration of changing different knives and duration of upper extremity impairments. Meat cutters who change their knives are in the risk group for developing musculoskeletal impairments for this reason (Karlun et al., 2016). In our study, it was seen that the subjects frequently had hand-finger injuries (60%) (Table 3).

More information is needed to understand the workers' education level, their environment and thus determine the accurate movements in the meat cutting procedure (Karlun et

al., 2016). In our study, it was determined that butchers traditionally continued the family occupation, 6 out of every 10 butchers received primary and middle-school education and 4% were university graduates (Table 1). Within this scope, specialized curricula should be formed and implemented. It seems very important to include occupational physicians in the active health surveillance programs with the purpose of identifying critical areas for butcher shop workers and developing efficient preventive precautions (Bonzini et al., 2014). In addition, posture and movement ergonomics analyses should be performed to prevent work related musculoskeletal system impairments. In order to be able to prevent impairments related to biomechanical excessive loads or manual carrying of loads and repetitive movement of the upper extremities, different study topics should be developed. In addition, physiotherapy methods should be developed for the well-being of the trunk and the extremities (Occhipinti et al., 2003).

As a result, it was determined that hand-finger injuries and waist problems are seen frequently in butcher shop workers and that protective equipment against accidents are not used. Therefore, it is considered that the required analyses should be done about the workers and training on protective measures should be given to prevent musculoskeletal system injuries and impairments related to work.

Conflict of interest

None to declare.

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None to declare.

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