



Analysis of Agricultural Accidents in Turkey

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Abstract: The people working in agriculture face with various dangerous factors. Therefore, the agriculture sector is considered as the most risky groups among all the sectors. The rate of work accidents in Turkey is far above the average in the developed countries. In order to prevent the work accidents, the characteristics of accidents should be determined and the preliminary precautions should be taken. As it is the case in the developing countries, sufficient study about labor security and worker health is not available in Turkey, either. In this study, the work accident characteristic of agriculture sector in Turkey has been tried to be determined. The values in agriculture sector have been compared with the averages of the other sectors and the differences have been determined. It has been regarded that this study will be a positive step for decreasing the rate of work accidents, which brings together many physical and moral burdens in Turkey which has 20 millions of agricultural population.

Key words: Agriculture, work accident, work safety, accident rate

Türkiye'deki Tarımsal İş Kazalarının Analizi

Öz: Tarım ve hayvancılık sektörü çalışanları çok değişik tehlikelerle karşı karşıyadır. Bu sebeple tarım sektörü, tüm sektörler içinde en riskli gruplar arasında kabul edilir. Türkiye'de iş kazası oranları gelişmiş ülke ortalamalarının oldukça üzerindedir. Kazaların önlenmesi için kaza karakteristiklerinin ortaya konması ve öncelikli önlemlerin alınması gerekmektedir. Gelişmekte olan ülkelerde olduğu gibi Türkiye'de de iş güvenliği ve işçi sağlığı konusunda yeterli çalışma bulunmamaktadır. Bu çalışmada, Türkiye'de tarım sektörünün iş kazası karakteristiği ortaya konmaya çalışılmıştır. Tarım sektöründeki değerler diğer sektör ortalamalarıyla karşılaştırılarak farklılıklar belirlenmiştir. Bu çalışmanın 20 milyon tarım nüfusunun bulunduğu Türkiye'de maddi manevi birçok yükü beraberinde getiren iş kazalarının azaltılmasında bir adım olacağı düşünülmektedir.

Anahtar Kelimeler: Tarım, iş kazası, iş güvenliği, kaza oranı

Introduction

Related to work accidents which are defined as "an unexpected event, which has not been planned in advance, causing a certain loss or injure" by International Labor Organization, when the issue is handled by social policy and labor security point of view, it can be seen that work accidents are defined as "work accidents are the events in which the worker loses the labor power completely or partially, because of the working conditions, quality and process of the work or the machines, tools, instruments and materials used for work" (Arikoğlu 1992, Tufan 1994).

It is well-known that the tendency for accidents is related to the education of the person, his harmony to work, the ergonomic conditions of the ambiance and the sense organs of the person rather than being really clumsy (Bilir 2004, Takala 1998, Westerholm and Baranski 2000).

The work accidents lead to very serious many physical and moral losses in all over the world. While hundred thousands of people lose their lives because of work accidents millions of people become disabled and disable for service. Loss of work power, treatment costs, and the other costs are in the level of millions of dollars.

International Labor Organization (ILO) estimates that 335.000 death cases occur because of work accidents and the death ratio is 14 per 100.000 and states that the highest rate of death occurs in developing countries (Herbert and Landrigan 2000; Takala 1999).

In the study where the estimation and comparison of work accidents are performed in 175 countries, 264 millions of non-fatal work accidents and

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350.000 fatal work accidents in the world are estimated for the year 1998. It has been emphasized that 970 people died in average daily and 760 people have become disabled for service more than 3 days and that work accidents are a great problem (Hamalainen et al. 2006).

Every labor branch has particular risks. Those working in agriculture sector face with various dangerous factors. Factors such as machines, animals, electricity, other power resources, agricultural insecticides, other chemicals, noise, and high working places constitute high risk. In many studies, this subject has been considered and it has been emphasized that agricultural sector is the leading one among the other sectors (Bell et al. 1990, Fragar 1996, Hope et al. 1999, Jackson 1983, Rossignol and Pineault 1993, Stoskopf and Venn 1985, Von Essen and McCurdy 1998).

In order to prevent the work accidents, the reasons for accidents should be determined and compared analyzes should be performed, therefore, the characteristics of fatal and non-fatal work accidents should be determined (Buck 1985, Erkan 1989, Tufan 1994).

The accident characteristic including the injured body part, wound type and reasons for accidents in agricultural labor accidents has been a subject of various researches (Brison and Pickett 1991, Browning et al. 1998, Crawford et al. 1998, Lee et al. 1996, Lewis et al. 1998, Myers 1998, Nordstrom et al. 1995, Pratt et al. 1992, Zhou and Roseman 1994, 1995).

In Turkey, few researches have been performed in labor security and worker health as developed countries. Despite the work accident rates occurring rather above the developed countries generally, no policies are produced about preventing the work accidents in national level and sufficient precautions are not taken.

In this study, the accidents exposed by the workers with obligatory insurance in agriculture sector between the years 2003-2005 in Turkey has been researched and the accident characteristic has been determined and a step has been tried to be formed in order to take the required precautions.

Materials and Methods

In Turkey, reporting and recording the work accidents is far behind the developed countries. In the preliminary negotiation performed with the social security institutions before inspecting the work

accidents, it has been determined that no accident statistics has been recorded in the institutions such as Bağ-Kur, Emekli Sandığı but these data has been recorded only in Social Insurances Institution (SSK). It has been detected that no work accident statistics were available in State Statistics Institute. Studies are available in order to harmonize the record system of work accidents within the framework of the European Union Legislation. The record of the work accidents started to be entered in data processing system with the standard codes in EU countries as of the year 2003. Also in this study, the data obtained by filtering the information about the agriculture sector among the work accidents between the years 2003-2005 from the SSK information obtaining system has been collected and classified in Microsoft-Excel program. The data obtained are the work accidents exposed by those working as obligatory insured in agriculture sector. The professional diseases are not included in the research. The average and percentage dispersion of work accidents in the other sectors in the period between the years 2003-2005 has been included in the end of the tables, which are formed, and z test has been performed for comparing two ratios in MINITAB 15 statistical program. Therefore, the difference of the work accidents in agriculture sector and in all the other sectors has been determined.

There are various parameters for determining the rate of work accidents. The most important of those is the work accident rate and it is used frequently as the work accident rate among 100.000 workers. Further the rate of fatal injures to working population is also used (Bailer et al. 1998, Leigh 1995, Toscano 1997, Toscano and Windau 1993). Therefore, these evaluations take place also in this study.

In order to determine the characteristics of the labor accident the average of sex, age, injured body part, reason for accident, the values of working hours in which the accident took place has been taken for the years 2003-2005 in order to establish the characteristics of work accidents and they are compared as agricultural and other sectors (Harker et al. 1991, McCurdy and Carroll 2000, Myers 1998, Pickett et al.1995, Pickett et al. 2001, Solomon 2002, Von Essen and McCurdy 1998).

Results and Discussion

Accident rate: 398 agricultural accidents has been determined, seven of which is fatal as average, which has been recorded in the inspection period. The average of the number of the obligatory insured in the same period is 43754. When the rate of accidents in

100000 is inspected, it is seen that the rate of accidents is 909 and the fatal accident rate is 16. In the other sectors, the accident rate is determined as 1255 in 100000 and the fatal accident rate is determined as 14.5 (Table 1). In some studies the agricultural accidents rate has been found between 1410 and 14700 in 100000 (Browning et al. 1998, Hanford et al. 1982, Lee et al. 1996, Lyman et al. 1999, Nordstrom et al. 1995, Zhou and Roseman 1994).

In the investigation where the general work accidents are inspected, the rate of accident has been determined as 1329-7073 in 100000 and the fatal accident rate has been determined as 1,6–7,7 in 100000 in the European Union Member Countries (Dupre 2001). In his study where he searched the accidents caused by agricultural instruments, machines and tractors in Turkey, Gölbaşı (2002) has determined that 21.72% of the accidents with machines and 28.76% of tractor accidents resulted in death.

When the accidents rates are compared, it has been determined that the agricultural sector is risky in the rate of 0.72 when compared to other sectors. In all the researches carried out in other countries, it has been mentioned that the agricultural sector is more risky than the other sectors (Bell et al. 1990, Fragar 1996, Hope et al. 1999, Jackson 1983, McCurdy and Carroll 2000, Myers et al. 1999, Pickett et al. 1999, Rossignol and Pineault 1993, Solomon 2002, Stoskopf and Venn 1985, Von Essen and McCurdy, 1998).

When the recorded data are compared with the other search results, it has been seen that the accident rates are rather low. The fatal accident rates are rather high. This situation recalls the deficiencies in reporting and recording of the accidents. Many researchers have mentioned this issue (Solomon 2002, Harker et al. 1991). In a study carried out in Sweden, (Hansson et al. 1989) a questionnaire of 20000 persons has been performed, and the number of accidents which is 5000 in official records have determined as 10000 in questionnaire results. In the study carried out in United States, unrecorded work accidents, which had resulted

with injures and death in the rates between 33% and 69% has been determined (Leigh et al. 2004).

In accordance with the SSK laws, the work accidents have to be reported to SSK by the workplace until the end of the following workday. Despite these laws, many accidents are not reported and recorded. The fact that the injured person does not inform the employer of the accident considering his respectability or because of being afraid from losing his job and that the employer does not report the accident which does not require hospitalization to avoid from bureaucratic operations leads to the fact that many events are not recorded. Therefore the discrepancy in the findings can be explained with the fact that accidents resulting with death or serious injures are mostly recorded but non-serious small injures are not reported. In the rural area which is the work place of the agricultural sector, the reporting rates of the accidents are lower.

Gender: The rate for woman has been determined as 11% and man as 89% in agricultural work accidents (Table 2). When the ratio of 5.1% is considered in the other sectors, it has been determined that the women in agricultural sector are under risk for 2.1 times more than those in the other sectors ($P<0.001$). The rate of accidents per 100000, which is calculated by considering the number of the insured in the sector, is 701 in women and 943 in men (Table 3). This value is 313 and 1500 in the other sectors respectively. In the calculation carried out in this way, it is seen that the women working in agricultural sector is under risk 2.2 times more than the women working in non-agricultural sector similarly, In their study, Pickett et al. (2001), has determined that the rate of men is greater in injured cases because of agricultural machines in the rate of 1 to 9 and in injured cases without machines in the rate of 1 to 3. Dimich et al. (2004) has determined that the men are exposed to work accidents 9 times more. Gölbaşı (2002), has stated that 83.05% of the casualties resulting from agricultural machines are men and 16.95% of them are women, in his study. In the accidents resulting from tractors, this rate has been determined as 90.96% in men and as 9.04% in women.

Table 1. Work-related accidents and accident rates in agriculture and other sectors during 2003-2005 in Turkey *

	2003	2004	2005	Average of Agriculture	Average of all other sector	Risk Rate**
Number of compulsory insured	40821	43263	47178	43754	6194611	
Number of accident	429	406	358	398	77743	
Rate of accident (per 100000)	1050.9	938.4	758.8	909	1255	0.72
Number of death	5	3	13	7	901	
Fatality rate (per100000)	12.2	6.9	27.6	16.0	14.5	1.1

*Source: SSK data, **ratio of agriculture average to all other sector average

Table 2. Distribution of work-related accidents during 2003-2005 in Turkey¹

Gender	Agricultural accidents	%	All other accidents	%	Risk Rate ²	P-value
Female	44	11.0	3998	5.1	2.1	*
Male	354	89.0	73745	94.9	0.9	*
Age						
<24	49	12.4	14642	18.8	0.7	*
25-29	81	20.5	19267	24.8	0.8	***
30-34	83	20.8	16661	21.4	1.0	NS
35-39	71	17.9	12549	16.1	1.1	NS
40-44	73	18.4	9497	12.2	1.5	*
45-50	25	6.2	3660	4.7	1.3	NS
50<	15	3.8	1465	1.9	2.0	***
Part of body injured						
Head	39	9.9	6958	9.0	1.1	NS
Back	13	3.3	4239	5.5	0.6	NS
Trunk and internal organs	17	4.2	2180	2.8	1.5	NS
Fingers	66	16.7	15579	20.0	0.8	NS
Hand	93	23.5	19401	25.0	0.9	NS
Arm	25	6.4	4421	5.7	1.1	NS
Shoulder	6	1.4	910	1.2	1.2	NS
Toes	9	2.3	1483	1.9	1.2	NS
Foot	74	18.6	15306	19.7	0.9	NS
Leg	14	3.4	2380	3.1	1.1	NS
Hip	6	1.5	593	0.8	2.0	NS
Whole body and multiple sites	15	3.8	1780	2.3	1.6	***
Other Parts of body injured	20	5.0	2512	3.2	1.6	***
Type of accident						
Falls of persons	77	19.3	9106	11.7	1.6	*
Stepping on, striking against or struck	70	17.6	20164	25.9	0.7	*
Struck by falling objects	62	15.5	13972	18.0	0.9	NS
Sharp piercing device	58	14.5	9589	12.3	1.2	NS
Motor vehicles	34	8.6	2794	3.6	2.4	*
Machinery	33	8.4	9160	11.8	0.7	***
Others	22	5.4	6132	7.9	0.7	NS
Animals	11	2.8	35	0.0	61.4	*
Challenging of the body	11	2.8	2372	3.1	0.9	NS
Extreme temperatures	10	2.6	1856	2.4	1.1	NS
Contamination with a foreign object	6	1.6	2164	2.8	0.6	NS
Electric current	4	0.9	399	0.5	1.8	NS
Working hour						
1st hour	79	19.9	14924	19.2	1.0	NS
2 nd hour	58	14.7	11485	14.8	1.0	NS
3 rd hour	58	14.5	11285	14.5	1.0	NS
4 th hour	61	15.3	10313	13.3	1.1	NS
5 th hour	23	5.9	6521	8.4	0.7	NS
6 th hour	33	8.2	6567	8.4	1.0	NS
7 th hour	49	12.2	7871	10.1	1.2	NS
8 th hour	37	9.3	8778	11.3	0.8	NS
Total	398	100.0	77743	100.0	1.0	

¹ Source: SSK data, ² ratio of agricultural accidents percentage to all other accidents percentage
 NS: Not Significant, *:P<0.001, **:P<0.01, ***:P<0.05

Table 3. Gender differences in occupational accidents during 2003-2005 in Turkey*

Gender	Number of accident in agriculture	Number of compulsory insured employees in agriculture	Injury rate (per 100000)	Number of accident in all other sector	Number of compulsory insured employees in all other sector	Injury rate (per 100000)	Risk Rate**
Female	44	6227	701	3998	1278112	313	2.2
Male	354	37527	943	73745	4916499	1500	0.6
Total	398	43754	909	77743	6194611	1255	0.7

*Source: SSK data, ** ratio of agricultural Injury rate to all other sector Injury rate

Age: In agricultural accidents the dispersion of the age groups is agricultural accidents is 12.4% for those under 24 years of age, 20.5% for those between 24-29, 20.8% for those between 30-34, 17.9% for those between 35-39, 18.4% for those between 40-44, 6.2% for those between 45-50 and 3.8% for those over 50 years of age (Table 2). When the agricultural accidents are compared with those in the other sectors, the dispersion per percentage is higher in the other sectors in every age group until the age of 35, however it is seen that the percentages of agricultural accidents older the age of 35 is more than the other accidents. When the average of age for work accidents in the sectors is taken, the average of age which is 34 similarly in agricultural accidents, has been determined as 32 in the other accidents. The dispersion by percentage, which decreases fast after the age of 24-29 in the other accidents does not fall rapidly in agricultural accidents and remains high in the following ages. The age of the worker means the experience of the worker indirectly. It is possible to explain the decrease in the accident rates in the forthcoming ages in this way. (Goldcamp et al. 2004, Gölbaşı 2002, Lewis et al. 1998, Nordstrom et al. 1995, Pratt et al. 1992, Zhou and Roseman 1994). The accident rates which goes a little bit high in the following ages in agricultural sector when compared to the other sectors mean that the reasons for accident result from the hard working and environment conditions, and that the effect of the experience of the people decrease and the effects of the environmental factors increase.

Part of body injured: In agricultural accidents the rates of part of body injured are as follows: the first three are hands with 23.5%, feet with 18.6% and hand fingers with 16.7%, these are followed by head with 9.89%, arms with 6.37%, body and organs with 4.19%, more than one parts with 3.77%, legs with 3.44%, back with 3.27%, toes with 2.35%, hips with 1.51% and shoulders with 1.42% (Table 2). The total percentage of such injures is 58.8% and the dispersion in the other accidents occur in similar way and their total is 64.7%. It has been observed that injures in agricultural accidents are more various when compared to other

accidents. The difference between the rate of injures related to whole body and multiple sites and other parts of body injured are considered as significant ($P<0.05$), however, the differences between the injured body parts other than these are considered as insignificant ($P>0.05$). In the other studies, in harmony with our research, it has been mentioned that hands and hand fingers are the most common injured body parts (Brisson and Pickett 1991, Browning et al. 1998, Gölbaşı 2002, Hanford et al. 1982, Jansson and Jacobsson 1988, Myers 1998, Pratt et al. 1992, Zhou and Roseman 1994, 1995).

Type of accident: The first three in agricultural accidents are falls of persons with 19.3%, stepping on, striking against or struck with 17.6% and struck by falling objects with 15.5% and these are followed by sharp piercing device with 14.5%, motor vehicle with 8.6% and machinery with 8.4%, animals with 2.8%, challenging of the body with 2.8%, extreme temperatures with 2.6%, contamination with a foreign object with 1.6%, electric current with 0.9% (Table 2). When compared with the other accidents it has been determined that the differences in accidents because of falls of persons, motor vehicles and animals are very important on account of agricultural accidents ($P<0.001$), the differences in accidents related to stepping on, striking against or struck is important on behalf of the other accidents is very important ($P<0.001$) and the differences in accidents related to machinery are important on account of the other accidents ($P<0.05$), and that the differences in accidental reasons other than these are not significant. In some studies it has been observed that the injures resulting from falls, machinery and animals take the first place (Browning et al. 1998, Hansen 1986, Hopkins 1989, Layde et al. 1996, Pratt et al. 1992, Zhou and Roseman 1994). We can explain the fact that the accidents resulting from machinery and animals are not in the first degree just as the opposite of the other researches with the reasons that most of the people dealing with animal breeding are not insured and the agricultural mechanization level in our

country is far behind the developed countries in which the researches has been performed.

Working hour: The percentage dispersion of the agricultural work accidents in accordance with working hours are very similar to the other accidents and the difference between them is insignificant ($P>0.05$) 19.9% of the agricultural accidents take place in the first hours of the work and this is followed by 2nd hour with 14.7%, 3rd hour with 14.5%, 4th hour with 15.3%, 5th hour with 5.9%, 6th hour with 8.2%, 7th hour with 12.2% and 8th hour with 9.3% (Table 2). The important point in the general of the work accidents is the fact that the accident rates in the highest level in the beginning of the working hours decrease in the following hours and increase again through the end of the working hours. In the beginning of the working hours, the reason for work accidents is lack of concentration and in the end of the working hours the accidents are related with being tired. In his study, Gölbaşı (2002) has stated that the 40.30% of the accidents resulting from agricultural machines and 33.33% of the accidents resulting from tractor occur in the afternoon.

Accident severity: The casualties who are cured in hospital for 491 days in 398 accidents in agricultural accidents in Turkey became disabled for working in 11941 days (Table 4). These values, which correspond to 1.24 and 30.02 days respectively per accident, are rather high when compared to those values of 0.89 and 24.80 in the other accidents. This situation means that the severity of the agricultural accidents is higher when compared to the other accidents. It has been mentioned that the loss of labor force of the agricultural accidents, which is 24 days for average, is 19 days in the other sectors in England (Health and Safety Commission 2001).

Limitations: The rate of those working without being registered to any social security institution is 45.6%. While the rate of those working without social security in agricultural sector is 87.4%, this rate is 31.7% in the sectors other than agriculture (TÜİK, 2007). In the same period, approximately 6 millions of people work in agricultural sector. The most comprehensive source related to labor accident is the SSK statistics. The record of these data has been reorganized with the EU harmonization protocols and the filtering of the information from the system is possible for the year 2003 and afterwards. However these data cover the work accidents with those working with obligatory insurance in the sector and the work accidents reported by the employer. The insufficiency of the data to be worked about the labor accidents has also been emphasized in the study of Gölbaşı (2002). Therefore, it is not possible that the

data analyzed in our study reflects the entire agricultural sector. Accident rates far below the developed countries and fatal accident rates far above the developed countries have been determined as a result of the study. There are great deficiencies related to reporting of the work accidents. Tan (2001) has emphasized that the issue of labor health and security in Turkey is not adopted by the political authorities in the sufficient level and that the central and local administrations of the government do not fulfill their duties for the required supervision and monitoring on the workplaces. Most of the accidents resulting with small injures are not reported by the worker or the employer and the event is recorded only when a hospitalization is required. Although the accessible accident statistics are limited, they constitute importance for uncovering the characteristics of work accidents.

Conclusion

In this study the characteristic of the agricultural work accidents in Turkey has been stated and its difference has been determined according to the other sectors. The population of agriculture decreases per year and is still over the average of the developed countries. Approximately 20 millions of people live together with agriculture in rural areas. These people are under high risk because of harsh working conditions and various dangers as is the case in all over the world. With the studies, the detailed accident characteristics are formed, risk factors should be determined and strategies should be developed by establishing the risk factors. In order to obtain these data, serious steps should be taken for reporting labor accidents in both agricultural sector and the other sectors. By performing wide scale questionnaires and by considering the studies in the other countries, the required precautions should be taken and the work accidents, which bring together many burdens in both manners, should be decreased. We think that our research will constitute a step in such studies and will enlighten the studies to be carried out afterwards.

Table 4. Accident severity during 2003-2005 in Turkey *

Accident severity	Agricultural Accidents	Per accident	All other accidents	Per accident
Days in the hospital	491	1.24	69114.3	0.89
Temporary incapability	11941	30.02	1928320.7	24.80

*Source: SSK data

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