RESEARCH ARTICLE / *Araştırma Makalesi*

The Effect of Occupational Health and Safety Education on Hazelnut Agriculture Workers' Knowledge Levels Related to Physical and Ergonomic Hazards

Fındık Tarımı Çalışanlarında İş Sağlığı ve Güvenliği Eğitiminin Fiziksel ve Ergonomik Tehlikelerle İlgili Bilgi Düzeylerine Etkisi

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Abstract

Introduction	The study aimed at identifying dangers and risks encountered by hazelnut farm workers and exploring the effect of occupational health and safety training about hazelnut farming upon the workers' knowledge level.
Materials and Methods	In this research, which was conducted as an intervention study, the pre-test post-test single-group research pattern was used. Training and brochures were given to 60 hazelnut agriculture employees selected using a random sampling method after the pretest. The change in the current knowledge score was examined statistically with the last test application two weeks later.
Results	53.3% of the participants were male and their average age was 43.0±14.4 years. 60.0% of the participants stated that they had accidents while they were engaged in hazelnut farming and 71.7% of them did not have any training about occupational health and safety previously. Participants' score of knowledge about physical dangers and risks as to occupational health and safety was 62.7±17.8 before the training while it significantly increased to 79.3±16.3 after the training. It was seen that after the training held; having a previous training, having high educational status, having no accidents previously and being at a young age affected post-test scores significantly.
Conclusion	In the study, it was explored that hazelnut farming workers in Trabzon Province lacked knowledge about physical and ergonomic risks in relation to occupational health and safety. For the trainings of the workers; universities, provincial and district directorates of agriculture and agriculture cooperatives can be used.
Keywords	Workers Health; Farmers; Ergonomics; Hazelnut; Agriculture

Öz

Amaç	*Bu araştırma; fındık tarımı çalışanlarının karşılaştıkları tehlike ve riskleri belirlemeyi ayrıca fındık tarımına yönelik iş sağlığı ve güvenliği eğitiminin fındık tarımı çalışanlarının bilgi düzeylerine etkisini belirlemeyi amaçlamaktadır.*
Yöntem ve Gereçler	*Müdahale çalışması olarak yürütülen bu araştırmada ön test son test tek gruplu araştırma deseni kullanılmıştır. Rastgele örneklem yöntemi kullanarak seçilen 60 fındık tarımı çalışanına ön test sonrası eğitim ve broşür verilmiştir. İki hafta sonra yapılan son test uygulaması ile mevcut bilgi puanındaki değişim istatistiksel olarak incelenmiştir.*
Bulgular	*Katılımcıların %53,3'ü erkek olup yaş ortalamaları 43,0±14,4 yıldır. Katılımcıların %60,0'ı fındık tarımıyla uğraşırken kaza geçirdiğini, %71,7'si daha önce iş sağlığı ve güvenliği ile ilgili herhangi bir eğitim almadığını belirtmiştir. Katılımcıların iş sağlığı ve güvenliğinde fiziksel tehlike ve riskler hakkında bilgi puanı düzeyleri eğitim öncesi 62,7±17,8 iken eğitim sonrası 79,3±16,3 olarak anlamlı derecede artış göstermiştir. Eğitim sonrası son test puanına daha önce eğitim almış olmanın, yüksek eğitim düzeyinin, daha önce kaza geçirmemiş olmanın ve genç yaşta olmanın anlamlı olarak olumlu yönde etki ettiği belirlenmiştir.*
Sonuç	*Bu çalışmada Trabzon'da fındık tarımı çalışanlarının iş sağlığı ve güvenliği hakkında fiziksel ve ergonomik riskler konusunda bilgi eksiklikleri olduğu görülmüştür. Çalışanların eğitimleri için üniversiteler, tarım il ve ilçe müdürlükleri ve tarım kooperatifleri kullanılabilir.*
Anahtar Kelimeler	*Çalışan Sağlığı; Çiftçiler; Ergonomi; Fındık; Tarım*

GİRİŞ

Agricultural sector is always faced with dangerous processes and situations due to the challenges in working conditions. The reasons may be associated with such factors as unexpectedly changing climate, field and soil conditions, intense farming activities, presence of working conditions requiring physical strength and unorganized working situations in the field. Due to these different difficulties; farming always involves serious risks that may lead to severe problems.[1]

Most of the mortalities and injuries occurring in the developing countries are seen in professions that cover dangerous activities like agriculture, construction, fishing and mining in which majority of the population is employed.[2] According to the estimates of the studies done by International Labour Organization (ILO); 170 thousand workers are killed each year in agricultural sector that employ 1.3 billion people, 340 million workers are involved in dangerous occupational accidents and many workers suffer from occupational diseases.[3] The statistical office of the European Union (EUROSTAT) announced that farming workers are the second most risky group in terms of occupational accidents following construction workers.[4] According to the labour code numbered 6331; work places are classified as less dangerous, dangerous and highly dangerous work places. In this sense; agricultural workers are generally placed in dangerous and highly dangerous labour groups.[5] Hazelnut farming is categorized to be an agricultural sector that belongs to perennial plant production under the title of dangerous farming activities. When agricultural sector in Turkiye is examined, it is seen that Turkish agriculture is generally realized as small family businesses that employ family members for free who provide work force.[5] As enforced by the Occupational Health and Safety Code numbered 6331; occupational health and safety procedures have become compulsory for all sectors regardless of the numbers of the workers employed. However; those whose professional tasks are not defined very precisely, those who are self-employed and those who earn money by producing services and goods for their own economies are exempt from the enforcement of this code.[6] Therefore; family businesses, engaged in agricultural sector in Turkiye and generally composed of those working on their own account, are exempt from the Occupational Health and Safety Code.[7]

The studies done indicated that agricultural employees lack training and education and have very low level of knowledge as well as work or are forced to work under inadequate conditions in terms of health and safety. As emphasized above, hazelnut farming –classified under the title of dangerous farming activities- should be studied in terms of occupational health and safety because it is an agricultural activity that poses risks for employees.[8]

In our country, hazelnut agriculture is very important. The fact that Turkiye carries out majority of the global hazelnut production and dominates the hazelnut exportation makes studies on hazelnut farming and hazelnut workers important.[4] Our country provides 67-75% of global hazelnut production annually from hazelnut farming fields in Black Sea Region. Besides; hazelnut is the agricultural product that is one of the major sources of foreign currency inflow in Turkiye. According to the research results declared by Turkiye Ministry of Food, Agriculture and Livestock; hazelnut is an agricultural product in which nearly 400 thousand families are employed over 700 thousand acres of land.[9] Hazelnut farming workers are also subject to physical, chemical, biological, ergonomic and psycho-social risk factors as in other businesses.[10] Considering dangers and risks encountered by hazelnut workers; unanticipated and undesired situations -such as potential accidents that may occur while working in the fields- may negatively affect human life, human health, professional and work life. From this point of view; including hazelnut agriculture employees into occupational health and safety activities is a requirement; which is considered as a public health necessity.[9]

As in all agricultural productions, hazelnut agriculture bears more dangers and risks than thought.[10] Similar to other agricultural sectors; there are numerous physical, chemical, biological, ergonomic and psycho-social risks and hazards in hazelnut production. However; literature review concluded that workers of hazelnut farming are subject to physical and ergonomic risks and hazards more.[10] Therefore; variables we would like to underline in the study have been determined as physical and ergonomic factors.

One of the most important factors in occupational accidents is physical factor. Physical factors that are important in hazelnut farming are listed as heat, humidity, illumination, noise, vibration and dust. Various studies underlined how these physical factors cause and affect agricultural accidents. The results of these studies found that bad work conditions affect agricultural accidents directly and psychological status of agricultural employees indirectly.[1]

Another important factor in hazelnut farming is ergonomic factors. Ergonomics lexically is the study of occupations but when examined in depth, it is the science concerned with working conditions, working environment and full interaction with the mechanics of workers.[11] The International Ergonomics Association defines ergonomics as, "the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data, and methods to design in order to optimize human well-being and overall system performance".[12] According to another definition; ergonomics is the science of personal working. Additionally; ergonomics basically intends those jobs should be adapted to employees and employees to jobs and provides all the necessary conditions for all workers to work effectively by considering their qualities and abilities.[11]

The study aimed at exploring hazards and risks encountered by hazelnut farm workers and finding the effect of occupational health and safety training about hazelnut farming upon the workers' knowledge level.

MATERIAL and METHODS

The current study was done as an interventional study between March and May 2019 in Arsin County of Trabzon Province. The study, in which participation was voluntary, was done with hazelnut farm workers who accepted to join the study and gave written consents. Inclusion criteria were specified as follows: being older than 18, being engaged in hazelnut farming within the last one year and being available so that survey forms could be distributed twice during the study period. The difference between the post-test score to be obtained after the training held and the pre-test score was determined as 10% and the sample size was calculated to be at least 60 participants with a confidence level of 95% and power of 80%.[13]

In the study, interventional study design was employed using one group sample and pre-test and post-test. At the beginning, a survey form that included questions addressing physical and ergonomic hazards and risks those participants may face in hazelnut farming was administered in order to explore existing knowledge score of the participants and their actual knowledge scores were determined. A survey form of 35 questions, which was developed by the author, was administered to the participants. The first 10 questions of the survey form included participants' socio-demographic characteristics while the other 25 questions addressed possible physical and ergonomic hazards and risks that the participants may encounter in hazelnut farming. The first 13 questions of these 25 questions were designed to identify knowledge level of physical dangers and risks while the other 12 questions targeted at knowledge level of ergonomic hazards and risks.

The 25 questions that addressed knowledge level related to possible physical and ergonomic hazards and risks that the participants may encounter in hazelnut farming were developed by the author after a literature review was real-

ized. Each question is scored with 4 points and the highest score is 100. There are three different responses for each question and points range as follows: 4 (True), 0 (False) and 0 (No idea).

With the pre-test phase, planned as the first step of the study, participants' knowledge level about physical and ergonomic hazards and risks that they may encounter in hazelnut farming was found. After participants' pre-test phase was completed, "Occupational health and safety brochure for hazelnut farm workers" prepared in line with the existing physical and ergonomic hazards and risks in hazelnut farming was distributed to each participant. After the brochures were distributed, each participant received a theoretical and practical training of 40 minutes regarding occupational health and safety in hazelnut farming. Following the distribution of the brochures and the training held for the participants, survey forms were administered and the first phase of the study was completed.

The physical and ergonomic hazards and risks that the participants were generally subject to while being engaged with hazelnut farming were defined in the contents of the training provided to the participants. In addition; it was emphasized what participants can do in order to prevent hazards and risks, too. Participants were trained and informed of physical dangers such as noise, vibration and dust and lack or non-use of personal protective equipment and ergonomic hazards such as exhausting and heavy tasks, repetitive tasks, manual handling and difficult postures etc. At the end of the theoretical training, participants were asked to demonstrate some movements taught in the practical training that would reduce ergonomic risks. The questions to determine the knowledge scores about the training and brochure content used in the research and the dangers and risks in hazelnut farming were created by the researchers by scanning the literature and based on the "Occupational Health and Safety Guide for Hazelnut Farming Workers".[10]

In the second phase of the study; appointments were set for the same participants for two weeks later and the same survey form was again administered to the participants so that their knowledge level about physical and ergonomic hazards and risks that they may encounter in hazelnut farming could be identified. Thus, post-test score and pre-test score were compared and effectiveness of the brochure was measured.

The data were gathered after the ethical suitability of the research was approved by Ethical Council of Karadeniz Technical University, Medicine Faculty (with the decision dated 04.03.2019 and numbered 24237859-205) in accordance with voluntariness principle. The participants were thoroughly instructed in the aims and details of the study and thus "Informed Consent Principle" was achieved.

Statistical Analysis

The data obtained with the questionnaire forms were analyzed using the SPSS 23.0 statistical program. As the analysis results show; descriptive information was explained with numbers (n) and percentages (%) for between-group variables and mean and standard deviation figures for numerical data.

Compliance with parametric conditions was evaluated to determine the statistical tests to be used in the analysis of the data. The Shapiro-Wilk test was used to determine whether the parameters in the study showed a normal distribution. Chi-square test was used for statistical evaluation of nominal and ordinal data, and t test and ANOVA test were used for numerical data evaluation. The Mcnemar test was used for the pre- and post-training analysis of each of the occupational health and safety questionnaire questions, and the Wilcoxon test was used for the significance analysis of the score increase before and after the training and brochure distribution. A level of statistical significance of 0.05 was used in all tests.

RESULTS

The participant 60 hazelnut farm workers lived in Arsin County of Trabzon Province, 53.3% of the participants were male and their average age was 43.0±14.4 years while 46.7% of the participants were female and their average age was 37.2±15.0 years.

The socio-demographic characteristics of the participant 60 hazelnut farming workers were shown in Table 1. 55.0% of the participants were married, 26.7% of them had university degrees and 26.7% of them were housewives. It was found that 63.3% of the participants did not smoke, 58.3% of them earned their living from hazelnut production and 71.7% of them did not receive any training about occupational health and safety previously. When the distributions of the accidents that participants had while they were engaged with hazelnut farming were studied, it was understood that 60.0% of them had accidents previously.

Table 1. Socio-demographic characteristics of the participant hazelnut workers (n:60)

Socio-demographic characteristics		n	%
Gender	Male	32	53.3
	Female	28	46.7
Marital status	Married	33	55.0
	Single	27	45.0
Educational status	Literate	7	11.7
	Primary school	16	26.7
	Secondary school	8	13.3
	High school	13	21.7
	University	16	26.7
Profession	Housewives	16	26.7
	Civil servant	15	25.0
	Worker	11	18.3
	Retired	7	11.7
	Self employed	5	8.3
	Student	5	8.3
	Farmer	1	1.7
Smoking status	Yes	18	30.0
	No	38	63.3
	Quitted	4	6.7
Annual Income Type	Hazelnut farming	35	58.3
	Other	25	41.7
Status of receiving education related to occupational health and safety among hazelnut workers	Yes	17	28.3
	No	43	71.7
Status of having accidents while being engaged with hazelnut farming	Yes	36	60.0
	No	21	35.0
	Not remembering	3	5.0

The distribution of the responses given to the first 13 questions of the survey form that addressed participants' knowledge level regarding physical dangers and risks was presented in Table 2. 51.7% of the participants thought in the pre-test that it was correct not to drink fizzy drinks while they were working whereas the ratio went up to 88.3% in the re-test done after training. 91.7% of the participants thought that it was correct to eat by sitting on the ground during the meal breaks before the training. However, this ratio was found to go down to 58.3% after the training ($p<0.001$). Average water consumption should not exceed 6 glasses of water while working. In this sense; it was noted that 68.3% of the participants gave wrong responses to this question in the pre-test. However; this ratio went down to 30% after the training ($p<0.001$).

After the training, the ratio of those who answered correctly to the question that dust mask should be worn before entering dusty environments rose to 83.3% from 56.7% ($p<0.001$), the ratio of those who gave correct answers to the question that protective ear muffs should not be taken off while working rose to 50.0% from 25.0% ($p=0.003$) and the ratio of those who answered correctly to the question that hydration need of body can be determined with urine colour rose to 83.3% from 71.7% ($p=0.039$). Before the training, the rate of those who thought that it was correct that farming activities should be performed by having wind behind was 48.3% whereas it became 83.3% after the training ($p<0.001$). Before the training, 75% of the participants thought that pouring fertilizer in a position close to the ground was incorrect. After the training, the post-test showed that this ratio went down to 51.7% ($p=0.004$). The ratio of those who answered correctly to the question that agricultural machinery should not be used with oil-greased hands rose to 93.3% from 81.7% ($p=0.039$), the ratio of those who answered correctly to the question that bullae caused by sunburn should not be excised rose to 83.3% from 68.3% ($p=0.012$).

Table 3 demonstrated the distribution of the responses given to the questions of the survey form that addressed participants' knowledge level regarding ergonomic hazards and risks. The ratio of those hazelnut farm workers who answered correctly to the question that sawing-machine should not be used in order to prune tall branches of hazelnut tree while being engaged with hazelnut farming was 61.7% in the pre-test whereas the same ratio was found to be 81.7% in post-test after the training and brochure ($p=0.002$).

The ratio of those hazelnut farm workers who answered correctly to the question that load amount should be reduced whereas number of laps should be increased while carrying loads and being engaged with hazelnut farming was 53.3% in pre-test whereas it became 90.0% in post-test after the training and brochure ($p<0.001$). Meanwhile, the ratio of the participants who answered wrongly to the question that load amount should be lower than 20 kg. for the adults was 61.7% in the pre-test. However; in the post-test performed after the training and brochure this ratio reduced to 23.3% ($p<0.001$). Besides, in the pre-test 78.3% of the participants answered correctly to the question that vehicles should be loaded in a way not to block driver's angle while this ratio was found to go up to 93.3 in the post-test ($p=0.022$). On the other hand; 56.7% of the participants answered wrongly to the question that loads should not be lifted directly from the ground in the pre-test while in the post-test 31.7% of the participants answered wrongly to the same question after the training and brochure ($p<0.001$). The ratio of the participants who answered correctly to the question that nobody should be around while pruning trees was 83.3% in the pre-test while the same ratio became 68.3% after the training and brochure in the post-test ($p=0.035$).

The comparisons of the distribution of knowledge scores that were obtained before and after the training about physical and ergonomic hazards and risks in the hazelnut farming and hazelnut farm workers' socio-demographic characteristics was shown in Table 4. In the results, it was

Table 2. The distribution of the responses given to the questions that addressed physical dangers and risks

Questions that addressed physical dangers		**Pre test**		**Post test**		**p**
Fizzy and caffeinated drinks should not be drunk while working	Correct	31	51.7	53	88.3	**<0.001**
	Wrong	29	48.3	7	11.7	
Meals should be consumed by sitting on the ground during meal breaks	Correct	5	8.3	25	41.7	**<0.001**
	Wrong	55	91.7	35	58.3	
Water consumption should exceed 6 glasses per hour while working	Correct	19	31.7	42	70.0	**<0.001**
	Wrong	41	68.3	18	30.0	
Clothes should be changed as soon as possible when wet and sweaty	Correct	49	81.7	53	88.3	0.289
	Wrong	11	18.3	7	11.7	
Dust mask should be worn after entering dusty environments	Correct	34	56.7	50	83.3	<0.001
	Wrong	26	43.3	10	16.7	
Protective ear muffs should be taken off at certain intervals	Correct	15	25.0	30	50.0	**0.003**
	Wrong	45	75.0	30	50.0	
Dark colour of urine indicates hydration need	Correct	43	71.7	50	83.3	0.039
	Wrong	17	28.3	10	16.7	
First aid kit should be available for emergent situations	Correct	53	88.3	58	96.7	0.125
	Wrong	7	11.7	2	3.3	
Clothes that cover the body fully should be preferred	Correct	52	86.7	55	91.7	0.250
	Wrong	8	13.3	5	8.3	
Farming activities should be performed by having wind behind	Correct	29	48.3	50	83.3	**<0.001**
	Wrong	31	51.7	10	16.7	
Fertilizer should be poured in a position close to the ground	Correct	15	25.0	29	48.3	0.004
	Wrong	45	75.0	31	51.7	
Agricultural machinery should not be used with oil-greased hands	Correct	49	81.7	56	93.3	0.039
	Wrong	11	18.3	4	6.7	
Bullae caused by sunburn should be excised	Correct	41	68.3	50	83.3	0.012
	Wrong	19	31.7	10	16.7	

determined that the education and brochure initiative provided a statistically significant increase in all sociodemographic characteristics of hazelnut agricultural workers ($p<0.001$).

Table 3. The distributions and comparisons of the responses given by participants to the questions that addressed ergonomic hazards and risks (n:60)

Questions that addressed physical dangers		**Pre test**		**Post test**		**p**
Sawing-machine should be used in order to prune tall branches	Correct	37	61.7	49	81.7	**0.002**
	Wrong	23	38.3	11	18.3	
Load amount should be increased while number of laps should be decreased	Correct	32	53.3	54	90.0	**<0.001**
	Wrong	28	46.7	6	10.0	
Load amount should be bigger than 20 kg. for the adults	Correct	23	38.3	46	76.7	**<0.001**
	Wrong	37	61.7	14	23.3	
Vehicles should be loaded in a way not to block driver's angle	Correct	47	78.3	56	93.3	**0.022**
	Wrong	13	21.7	4	6.7	
Farming sacks of 80 kg should be preferred to those of 50 kg	Correct	44	73.3	49	81.7	0.227
	Wrong	16	26.7	11	18.3	
Heavy loads should be lifted directly from the ground	Correct	26	43.3	41	68.3	**<0.001**
	Wrong	34	56.7	19	31.7	
Manual vehicles and motor vehicles should not be used for carrying heavy loads	Correct	52	86.7	50	83.3	0.754
	Wrong	8	13.3	10	16.7	
Those carrying loads should be changed	Correct	51	85.0	51	85.0	1.000
	Wrong	9	15.0	9	15.0	
Loads should be lifted on tiptoe	Correct	39	65.0	47	78.3	0.057
	Wrong	21	35.0	13	21.7	
People should stay around while pruning trees	Correct	50	83.3	41	68.3	**0.035**
	Wrong	10	16.7	19	31.7	
Accidents should not be reported to anybody	Correct	56	93.3	56	93.3	1.000
	Wrong	4	6.7	4	6.7	
Loads should not be lifted with hasty movements and uncontrolled strength	Correct	49	81.7	51	85.0	0.687
	Wrong	11	18.3	9	15.0	

Table 4. The comparisons of the distribution of knowledge scores related to socio-demographic characteristics before and after the training

Socio-demographic characteristics		Before the training	After the training	p
		Mean±SD	Mean±SD	
Age	<30	68.4±10.2	86.7±7.1	**<0.001**
	30-40	69.8±14.7	83.3±17.8	**0.005**
	>40	56.5±20.6	73.2±17.9	**<0.001**
Gender	Male	67.0±14.6	81.2±15.4	**<0.001**
	Female	57.8±20.0	77.1±17.3	**<0.001**
Marital status	Married	62.7±15.0	78.4±15.0	**<0.001**
	Single	62.6±21.0	80.4±18.1	**<0.001**
Educational status	Primary school	54.6±21.9	73.3±18.6	**<0.001**
	Secondary school	61.9±11.7	77.5±14.8	**<0.001**
	University	75.5±8.9	90.2±7.9	**0.001**
Profession	Civil servant	75.7±10.5	89.0±8.8	**0.001**
	Self employed	64.4±13.8	80.0±15.2	**<0.001**
	Housewives	47.5±19.2	69.0±18.3	**<0.001**
Annual income type	Hazelnut farming	59.6±19.5	76.2±17.1	**<0.001**
	Other	67.0±14.4	83.6±14.5	**<0.001**
Having a previous training	Yes	69.4±10.7	87.2±9.0	**<0.001**
	No	60.0±19.4	76.2±17.5	**<0.001**
Status of having accidents in hazelnut farming	Yes	56.5±18.4	75.5±16.5	**<0.001**
	No	72.0±12.1	85.0±14.6	**<0.001**

DISCUSSION

All over the world as well as in our country, it is known that occupational health and safety procedures for agricultural workers have been improving significantly in the recent years. On the other hand; the fact that agricultural workers should be aware of the legal rights and privileges and that they are informed of occupational health and safety practices in agriculture or that they follow these occupational health and safety practices in agriculture is important.14 As in all occupational fields, in agriculture too, basic objective of occupational health and safety is to protect the employees.[15] It is thought that trainings to be held about occupational health and safety will increase awareness among farming workers and can reduce potential accidents while working.[14]

The average scores of the correct answers given by the participant hazelnut farm workers to the questions about physical dangers and risks increased in all questions. However; it was detected that a statistically significant increase was only seen in 10 of the questions. Although there was an increase in the ratio of answering correctly to the other three questions, no statistically significant difference was found.

As for the 12 questions related to the ergonomic hazards and risks; only 6 questions were correctly answered by the participant hazelnut farm workers; which was statistically significant. On the other hand, no significant change existed in the other 6 questions.

The significant statistical increase in the questions correctly answered by the participant hazelnut farm workers about physical and ergonomic hazards and risks in hazelnut farming demonstrated that the training was not successful enough in terms of behavior change. The rea-

son may have been that the duration of the training determined within the limits of the study was not long enough and participants' capacities were not advanced enough to produce a behavioral change or the participants had already demonstrated sufficient and correct behaviors.

In the study of Aybek et al (2003) that studied possible causes and prevention methods of occupational accidents, lack of sufficient trainings about occupational health and safety was identified to be the key factor for the participants to suffer from occupational accidents. In some regions of our country, it was noted that particularly agricultural workers receive inadequate and insufficient training about occupational health and safety.[16] The study of Aybek et al (2003) pointed out that regular and sufficient trainings to be planned and held for agricultural workers and provision of suitable training conditions can prevent 98% of occupational accidents in farming.16 In the study of Miller et al (1998), it was concluded that knowledge level of the students who received regular occupational health and safety trainings about occupational accidents increased year by year and it was found that the results of the study done by Miller et al (1998) concurred with the results of our study that was done in order to maximize hazelnut farm workers' knowledge levels of physical and ergonomic hazards and risks. Therefore; we are of the opinion that trainings in relation to occupational health and safety in hazelnut farming should be organized regularly and consistently through certain programs.[17]

It is necessary that the topic of occupational health and safety among hazelnut farm workers should be introduced and taught as a life style instead of organizing them as single session training. We are of the opinion that correct and regular occupational health and safety trainings to be held for hazelnut farm workers may yield positive outcomes.[18] Improving and developing workplace and working conditions of agricultural workers are an important start in terms of occupational health and safety. However; as in all occupational fields, in agriculture too, occupational accidents are mostly caused by workers and lack of education is one of the most important factors; which indicates that best solution to minimize agricultural accidents is to provide trainings about occupational accidents.[19]

CONCLUSION

In the study that we conducted, it was concluded that with occupational health and safety trainings to be provided to farming workers in hazelnut farming, potential dangers and risk factors can be reduced and potential accidents can be minimized.

Participant hazelnut farm workers' score of knowledge level about physical and ergonomic dangers and risks was 62.7±17.8 before the training while it increased to 79.3±16.3 after the training; which pointed out that participants in our study had significant increases in knowledge level about physical and ergonomic hazards and risks. From these results, we may introduce the following recommendations about physical and ergonomic dangers and risks for the researchers to conduct relevant studies and authorities:

For the occupational health and safety trainings of the hazelnut farm workers; universities, provincial and district directorates of agriculture and agriculture cooperatives can be appointed. Local TV channels and social media devices can be helpful in this respect. Unregistered employment, which is a particular barrier to providing occupational health and safety services in agriculture, should be struggled. It is necessary to register agricultural employees through a specific registration system and in addition, agricultural unregistered employment should closely be inspected. Since there is no legal enforcement in occupational health and safety in hazelnut farming, workers should be taught of occupational health and safety. Therefore; occupational health and safety services can be used as a prerequisite in providing agricultural incentives and loans. Physicians and health personnel of primary care health services who have an easy access to agricultural workers

can be encouraged to visit them and to correct their malpractices in the field. The number of the relevant studies should be increased and the results and study outcomes should be disseminated.

Limitations of the Research

In the research, it was aimed to determine the dangers and risks faced by hazelnut agriculture employees and to investigate the impact of occupational health and safety trainings given related to hazelnut agriculture on the knowledge levels of employees. It is suggested that similar studies should be carried out in a wider range of samples. In addition, since there is no scale in the literature that can measure the level of knowledge about the dangers and risks faced by hazelnut farming employees, the questionnaire used in the study was created by the researchers in accordance with the literature.

Ethics Committee Approval

The data were gathered after the ethical suitability of the research was approved by Ethical Council of Karadeniz Technical University, Medicine Faculty (with the decision dated 04.03.2019 and numbered 24237859-205) in accordance with voluntariness principle. The participants were thoroughly instructed in the aims and details of the study and thus "Informed Consent Principle" was achieved.

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Conflicts of Interest

The authors declare that there is no conflicts of interest.

Declaration of Contribution

Concept/Design: OT, GÇ, MT. Analysis/Interpretation: OT, GÇ. Data Acquisition: OT, GÇ. Writing: OT. Revision and Correction: OT, GÇ, MT, NEB. Final Approval: OT, GÇ, MT, NEB.

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