

Tea-Cutting Machines Generally Causes Injuries To Which Extremity?

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Abstract

Tea is a drink widely consumed all over the world. Tea growing is the most important source of income in the Eastern Black Sea region of Turkey. After many years of being harvested by hand, tea began being harvested by machine, giving rise to an increase in accidents involving the extremities. A retrospective investigation of 14 patients attending our university hospital due to tea-cutting machine accidents between January and December 2011 showed an age distribution of 19 to 71, and that 78.6% were male. The greatest number of cases was determined in September. Left lower extremities were frequently injured as a result of trauma (71.4%), with broken bones and severed tendons being observed in four of these (28.6%). While agricultural machines used in the harvesting and pruning back of tea raise the speed of production, they also lead to a rise in agricultural accidents. This study was intended to determine the severe injuries which such machinery can cause.

Introduction

After water, tea is one of the most consumed drinks in the world. The Eastern Black Sea is the only region of Turkey in which tea is cultivated. Tea was harvested by hand for many years, but as technology has advanced, machines have now begun being used (Figures 1, 2).



Figures 1, 2 Two different tea machines, used in the region, causing accidents.

An increase in accidents to the extremities has been observed as tea has begun being harvested using machines. Investigation of injuries of this kind, which had not been seen in the region before such technological devices began being used in harvesting tea, can provide significant data in terms of types of injury and relevant medical approaches.

Material and methods

Medical records of 14 patients who were admitted to Recep Tayyip Erdoğan University Training and Research Hospital between January and December

2011 due to tea-cutting machines accidents were evaluated retrospectively. Patients' data including age, gender, site and outcomes (treatment in the inpatient or outpatient unit) were recorded.

Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS, Inc., Chicago, IL, USA) version 15.0. Descriptive statistics were expressed as frequency and cross tables for categorical variables and as mean and standard deviation for numerical variables.

Results

Fourteen patients applying to our university hospital between January and December 2011 as a result of accidents involving tea-cutting machinery were investigated retrospectively. Patients with major trauma that depletes the labor force in the region apply to the institution that serves as a regional trauma center. The great majority of cases are treated either at small local hospitals or else using their own means. Of the cases applying to our center, 78.6% (n=11) were men and 21.43% (n=3) women, with ages ranging from 19 to 71 (mean age 47 ± 15.44).

Accidents were distributed from January to December. The left lower extremity was frequently injured as the result of trauma (71.4% n=10), broken bones and severed tendon being observed together in four (28.6%) of these cases. Upper extremity injury was seen in four (28.6%) cases. Subtotal phalanx amputation was performed in two

(14.28%) of those with right hand injuries. Ten (71.7%) cases were hospitalized in the Orthopedic

and Traumatology Clinic because of the severity of the lesions. No cases resulted in death.

Table I: General characteristics of injuries due to tea-cutting machines

N°	Age/Sex	Month	Lesion	Result
1	46/M	January	5-cm deep laceration involving extensor tendon and muscle between the 1st and 2nd toes of the right foot	Hospitalization at orthopedic department.
2	43/M	March	Open fracture of metatarsal and extensor laceration to the dorsal of the 2nd toe of the left foot	Hospitalization at orthopedic department.
3	31/F	March	10-cm oblique, cutaneous-subcutaneous-muscle laceration of the left femur proximal to the tibia	Polyclinic follow-up
4	64/F	March	7-cm left hand cutaneous-subcutaneous-muscle laceration	Polyclinic follow-up
5	68/F	April	Cutaneous-subcutaneous laceration on the left wrist extending to the hand	Polyclinic follow-up
6	71/M	May	Distal phalanx amputation and subtotal amputation of second finger of right hand	Hospitalization at orthopedic department.
7	50/M	July	Open fracture and extensor muscle-tendon laceration on left foot	Hospitalization at orthopedic department.
8	62/M	September	Subtotal amputation of first finger of right hand	Hospitalization at orthopedic department.
9	53/M	September	10-cm cutaneous lesion extending from the dorsal of the left foot to the tip of the second toe	Hospitalization at orthopedic department.
10	42/M	September	Tissue loss at the metatarsal level on the distal of the left foot, tendon laceration, open bone fracture	Hospitalization at orthopedic department.
11	35/M	September	Oblique 15-cm cutaneous-subcutaneous-fascia laceration from the sole of the left foot to the medial of the 5th metatarsal	Hospitalization at orthopedic department.
12	44/M	November	Transverse 10-cm laceration, tendon laceration, tibia fracture in the middle of the left tibia	Hospitalization at orthopedic department.
13	19/M	November	Extensor tendon laceration on the first toe of the left foot	Hospitalization at orthopedic department.
14	30/M	December	Extensor digitorum tendon laceration on the dorsal of the right foot	Polyclinic follow-up

Discussion:

The extract of the tea plant, Latin name *Camellia sinensis*, is the most consumed beverage in the world. Tea is consumed by approximately two-thirds of the world population [1]. It is cultivated in some 30 countries, especially India, China, Sri Lanka, Japan and Taiwan [2]. Tea is also one of the main agricultural products of the Eastern Black Sea region of Turkey [3].

The tea plant is an annual, growing from March to November. It is pruned in November and March, and the leaves are harvested 3-4 times a year between May and October. Each harvest period lasts approximately two weeks. Cases were also distributed during these months. In a 1995 study of farm injuries in the parkland region of Manitoba, Scott determined that injuries with hand-held equipment frequently took place in autumn months [4]. This is in agreement with our study. A total of 28.6% of our cases were injured in September, in

the autumn harvest period. Işık et al.'s study of threshing machinery-associated upper extremity injuries in Turkey also observed an increase in the frequency of cases in August and September, the harvest season [5].

Tea shoots are harvested by hand, using scissors, or with machinery [6]. Until the late 1990s tea was harvested by hand without damaging the plant leaves. Because of the imbalance between production and labor, harvesting began to be performed by machine in the 2000s [7]. While the rate of production increased as machines became involved in the harvesting process, a number of accidents also began to be seen. Machine-based agriculture is one of the most dangerous occupational categories in developed countries such as the USA, Australia and Finland [8]. In Turkey, machinery used for harvesting tea imported from abroad or developed by the people of the region began to be employed in the 2000s [9, 10].

Globally, occupational machinery is frequently used by adult males. The higher level of accidents among males in this study is therefore an expected outcome. In agreement with our findings, a study of fatal farming injuries in Canada between 1991 and 1995 by Pickett et al. determined a higher frequency in males [8]. That similarity was also seen in Nag et al.'s study of agricultural injured and accidents in India in 2004 [11]. In Turkey, a study by Umut Tuncel of hand injuries among farmers engaged in hazelnut growing reported that 72% of cases involved males [12]. In addition, a 2004 study by Dimich-Ward et al. reported a 9:1 ratio in favor of males in terms of accidents with agricultural machinery requiring hospitalization, while in our study all the serious injuries requiring hospitalization were in the male population [13]. This shows that machinery-associated agricultural accidents are strongly weighted toward males.

In this study, accidents were more prevalent in the third decade and above age groups. As with our study, Dimich-Ward et al. reported a greater preponderance of accidents in the third decade and above age groups, and suggested that the reason for these accidents was physiological changes in the body occurring with increasing age [13].

Tea cultivation in Turkey began in 1944, and with a 40,000 hectare area the sector represents one of the main sources of income of the Eastern Black Sea region. A regional increase in agricultural accidents has been observed since machinery began being employed in tea cultivation in recent years. In a study of agricultural accidents, Scott determined a 14.5% level of extremity amputations and a 31.6% level of extremity fractures [4]. The corresponding levels in our study were 14.3% for extremity amputation and 28.6% for extremity fracture.

Globally, right- and left-handed individuals are not distributed equally in societies; approximately 90% of people are right-handed and 10% left-handed [14]. Right-handedness is also more common in the community representing our study population. Machinery used in agriculture is therefore frequently designed with right-handers in mind. However, the variations in knowledge and ability in society regarding the use of such equipment can cause accidents. Injuries caused by devices used with the help of the right hand appear in the diagonally opposite lower extremity due to the scything movement employed. Left lower extremity injuries were observed at a level of 57.1% in this study.

Conclusion:

Production technologies should be used to increase agricultural output. Only the use of modern agricultural machinery can make this happen. This

state of affairs, named as technological progress, increase the production and reduce the human physical activity. These kind of machines which is used for both harvest and production should be designed with the consideration of human characteristics and enough knowledge and skills should be provided to users. These machines which are designed for tea harvesting, can cause serious injuries. These kind of injuries are similar to injuries observed in other agricultural accidents. Measures should be taken throughout the country for agricultural injuries and surveillance programs should be conducted.

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