A study of the prevalence of having fractures and the affecting factors in young male adults throughout childhood and adolescence

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Injuries due to accidents in children and adolescents, who are more sensitive to different risk factors in their social and physical environments, play an important part in mortality and morbidity. Fractures are the most commonly seen problems among these injuries.

This cross-sectional study was carried out in a two-year vocational military school in Ankara between 1-10 May 2000. All, 2720 students in the school were included and data were collected via a questionnaire distributed to the students.

It was found that 418 (17%) out of 2,461 students we could interview had had a fracture. No statistically meaningful relationship was found between the frequency of having fractures and the educational status of the parents or employment status of the mother. However, it was seen that the frequency of fractures increased as the economical status of the parents increased.

The high frequency of fractures in childhood and adolescence in young males, and the traditional practice of going to unlicensed and medically untrained adults, and "bonesetters" (27% of those surveyed) are two important findings that should be taken into consideration.

Key words: fracture, prevalence, injury prevention.

Injuries due to accidents in children and adolescents, who are more sensitive to different risk factors in their social and physical environments, play an important part in mortality and morbidity. Primary reasons for the increase seen in the frequency of injuries in children and young adults are the increases in traffic and industrial accidents due to adolescents being more involved in working life and sports[2].

Injuries that do not result in death are still an important public health problem. In England 20-30% of children are seen in emergency services because of these injuries every year[3]. According to the U.S. National Health Research Community data, 25% of people between the ages of 0-21 have an injury once a year, and the yearly cost of this is US $347 billion. Seventeen billion dollars of this cost is for medical care, 72 billion is the loss of potential labor in the future, and 257 billion is loss of quality of life. According to a study carried out in 1994 in 22 countries by the WHO on children between the ages of 11-15, the percentage of children who needed medical care in one year due to an injury was reported as 17.4% in Wales, 8.9% in Norway, and 6.8% in Sweden[5]. It was found that sport injuries formed 36% of all injuries and that the injury rate increased as age increased in children and adolescents[2]. Moreover, it was also seen that injuries that do not result in death were observed more in males and were affected by factors like environment, socioeconomic level and climate[1,6].

Fracture is a traumatic injury in which bone structure is completely or partly destroyed, and it constitutes 10-25% of all injuries in childhood[7,8]. In recent years there has been an increase in epidemiological studies, but these are usually carried out among groups of the elderly. On the other hand, there are very few

studies carried out on children and adolescents who are an important group in terms of frequency and cost[9].

Most of the fractures are due to sport or entertainment injuries. Sport injuries constitute 48% of all fractures[2]. Moreover, in some countries an increase has been observed in the rate of fractures and dislocations. A study carried out in Sweden reported that fractures due to sport increased five-fold between 1950 and 1979[10].

The aim of this study was to determine the frequency of fractures in male children and adolescents in Turkey, to evaluate the role of bonesetters in treating fractures (an important problem in our country) in terms of the treatment of fractures and dislocations and to identify the sociodemographic factors related to the prevalence of fractures.

Material and Methods

This cross-sectional study was carried out in a two-year vocational military school in Ankara between 1-10 May 2000. 2,720 male students in the school were included in the study.

Data for the study were obtained through a questionnaire consisting of 20 questions prepared by the researchers in order to collect information about the characteristics of the subjects, to identify whether they had had a fracture and, if yes, to find its localization, and to learn how the fracture occurred. The students were asked the questions during their periodical inspections. The data were analyzed by the researchers using SPSS for Windows 9.0.

Results

The questionnaire was given to 2,461 of 2,720 students. Two hundred fifty-nine students were excluded for reasons such as refusal to take part in the study, not appearing for examinations, or for health problems.

Four hundred and eighteen out of 2,461 students (17%) reported that they had had a fracture once in their life. The mean age of students with a fracture at some time was 21.7 ± 2.23, and of students who never had a fracture was 21.7 ± 4.69. When we look at the distribution of the age of having fractures (Fig. 1), we see that fractures primarily occurred between the ages of 10-15 years.

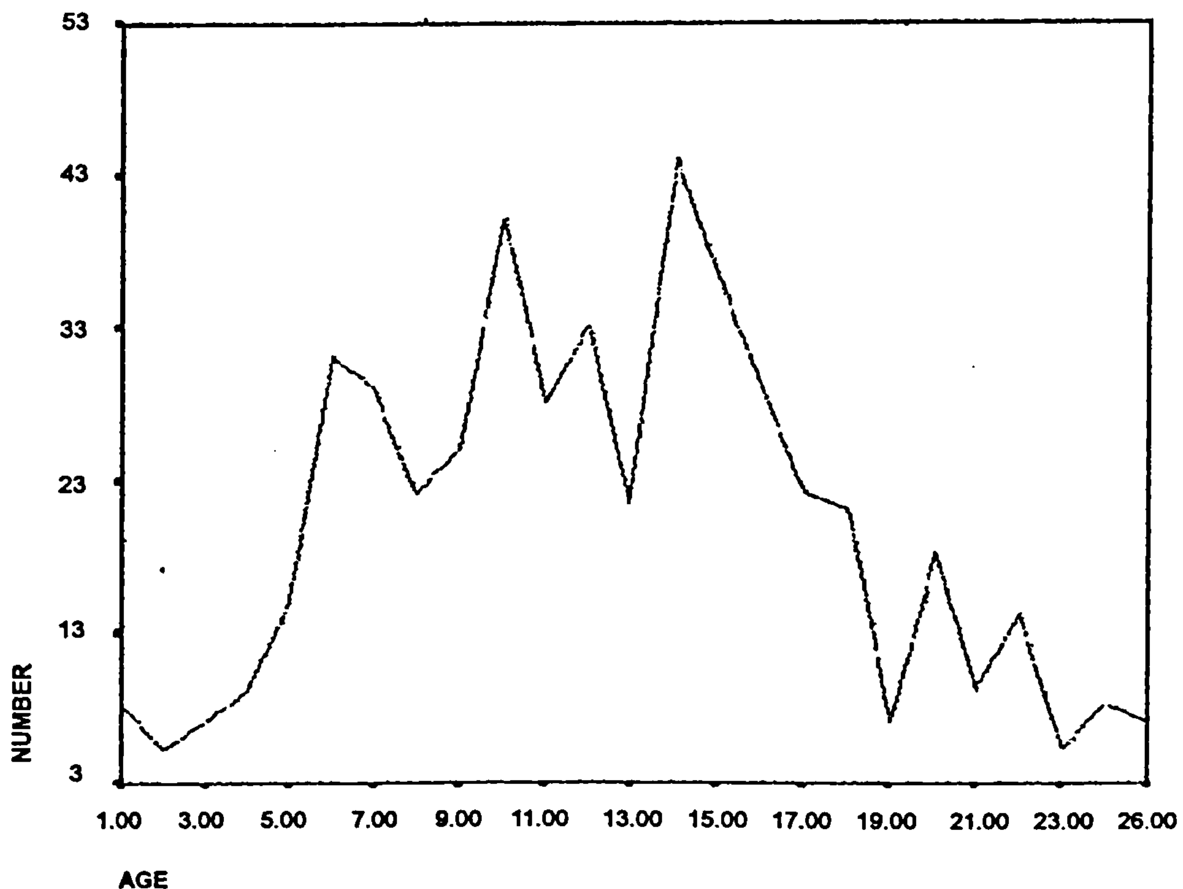

Fig. 1. The distribution of the age of having fractures of the subjects.

Concerning employment of the fathers of the subjects, 34% were civil servants and 24.6% farmers, and 12.9% did not have a job (Table I).

Table I. Distribution of the Paternal Employment

Job	Number	%
Civil servant	142	34.0
Farmer	103	24.6
Worker	72	17.2
Unemployed	54	12.9
Small-scale retailer	34	8.2
Other	13	3.1
Total	418	100.0

When we look at some of the characteristics of the students who had fractures at some time in their lives, we can see that 7.4% had an operation, 53.1% went to an orthopedic surgeon, versus 26.8% who went to a bonesetter, and 5% did not go anywhere. It was found that 73.9% had only one fracture whereas 2.9% had fractures four times in their lives.

Table II. Distribution According to Specific Parameters

	Number (n: 418)	Percentage (%)
Operated	31	7.4
Not operated	387	92.6
Treatment By		
Orthopedic surgeon	222	53.1
Bonesetter	112	26.8
General practitioner	58	13,9
Nobody	21	5.0
Unanswered	5	1.2
Fracture Number		
1	309	73.9
2	79	18.9
3	16	3.8
4	12	2.9
Unanswered	2	0.5

Twelve point one percent of students whose fathers were illiterate and 21.6% of students whose fathers were university graduates had had fractures. Sixteen point three percent of students whose mothers were illiterate and 15.4% of those whose mothers were university graduates had had fractures (Table III). No relation could be identified between the educational status of parents and having a fracture ($p < 0.005$).

Twenty point eight percent of students whose mothers worked and 16.9% of those whose mothers did not work had had fractures. No relation between working mothers and having a fracture could be established ($p > 0.005$).

Fifteen point seven percent of students whose family's monthly income was lower than 150 million TL had had fractures, while in the group of students whose family's monthly income was more than 300 million TL, this rate was 18.8%. A statistically meaningful relationship was found between the income level of the family and having a fracture ($p<0.01$) (Table III).

Table III. Distribution According to Parental Education, and Work and Income Status

	No fracture		Fracture		Statistical results
	Number	% (*)	Number	% (*)	
Father's educational status					
Illiterate	203	87.9	28	12.1	$X^2=7.65$
Primary/secondary school	1506	83.2	304	16.8	P=0.054
High school	265	79.8	67	20.2	
University	69	78.4	19	21.6	
Mother's educational status					
Illiterate	697	83.7	126	16.3	$X^2=2.54$
Primary/secondary school	1277	82.1	278	17.9	p=0.468
High school	58	82.9	12	17.1	
University	11	84.6	2	15.4	
Employed mother	61	79.2	16	20.8	$X^2=0.812$
Unemployed mother	1982	83.1	402	16.9	p=0.368
Income status (monthly)					
< 150 Million TL	1022	84.3	190	15.7	$X^2=12.5$
150-300 Million TL	944	82.7	197	17.3	p=0.002
> 300 Million TL	77	71.2	31	18.8	
Total	2043	83.0	418	17.0	

*: Line percent.

The most common reasons for fractures were falling from a high place (45.7%), sport injuries (41.1%) and traffic accidents (6.5%) (Table IV).

Table IV. Distribution of Fracture Causes

Fracture cause	Number (n)	Percentage (%)
Falling from a high place*	193	46.2
Sport injuries#	172	41.1
Traffic accidents	27	6.5
Others	16	3.8
Gunshot wounds	9	2.2
Unanswered	1	0.2
Total	418	100.0

* rooftops, windows, children's play area, furniture, trees.
# football, basketball, cycling, slipping on ice, ice-skating.

Fractures occurred mostly in the forearm (40.2%), wrist (25.8%) and ankle (17.2%) (Table V). Wrist dislocation was the most common dislocation (41.9%), followed by ankle (27.9%) and elbow (12.2%).

Table V. Distribution of Fracture Localization

Localization	Number	Percentage
Arm	168	40.2
Wrist	108	25.8
Foot	53	12.7
Ankle	29	6.9
Elbow	25	6.0
Head	21	5.0
Other	12	2.8
Unanswered	2	0.5
Shoulder	-	-
Knee	-	-
Total	418	100.0

Discussion

Any problem in public health can be considered a priority problem if it occurs frequently and/or is serious, and if it is amenable to measures for its treatment or, better still, its prevention. Fractures are a frequent problem, although our knowledge of their frequency is poor and biased[11].

The prevalence of having a fracture at some point in the subjects' lives was 17%. In different countries, subjects that would represent the whole country were chosen and the yearly fracture rate in children was found as 36/1,000 in Wales and 16/1,000 in Norway[3]. In a study carried out among a group of children in England who were 12 years old or younger the yearly fracture incidence was identified as 16/1,000[9]. In another study carried out in Sweden among a group of children between 1993-1994, the yearly fracture rate was 235/10,000 in males and 149/10,000 in females[10].

Fifty three point one percent of the subjects who had had fractures said that they went to an orthopedic surgeon, and 26.8% to a bonesetter, and 5% said they did not go anywhere (Table II). As can be seen, a significant percentage of people by tradition go to bonesetters, but they have no education in the treatment of fractures. It is known that fractures can cause damage in the adjacent tissues, neuromuscular structures, skin, muscles, and organs[12,13], thus there is a high risk of defect developing in the area of the fracture as a result of incorrect treatment. It can be understood, therefore, why this is an important public health problem when the social and economical costs of this situation are considered.

It has been reported that most fractures in childhood and adolescence occur between the ages of 10-13 years[14]. In different studies carried out recently, it has been observed that the childhood fracture rate increases with age[1,2,6,9]. In our study, when we looked at the distribution of the age for having fractures, we found that most occurred between 10 and 15 years old. Thus, our results are similar to the literature.

In a study carried out in the U.S. in an age group of 0-21, the highest rate of injury was found in the group whose family's monthly income was lower than $5000[4]. This result is different from ours. In our study, the fracture rate was relatively higher in the group whose family's monthly income was more than 300 million TL than in the group whose family's monthly income was lower than 150 million TL (18.8% and 15.7% respectively) ($p < 0.01$). In our country, it is observed that some health problems, like obesity, increase as an individual's socioeconomic level increases. This situation in Turkey, which is also identified in fracture prevalence, might result from the fact that an increase in income does not necessarily parallel an increase in education level, whereas in developed countries it usually does.

In our study the most common reasons for fractures were falling from a high place (rooftops, windows, children's play area, furniture, trees) (45.7%), sport injuries football, basketball cycling, slipping on ice, ice skating (41.1%), and traffic accidents (6.5%) (Table IV). In a study performed in England it was reported that fractures often occur around houses or as a result of falling from somewhere in the house[9]. In another study carried out in the U.S. with a group between the ages of 5-17, 30% of sport and entertainment injuries were a result of falling down in school[2]. The most common reason for injuries between the ages of 15-24 years was reported to be sport injuries[15]. Our results are similar to the results of these studies (Table IV).

In a study performed in Sweden it was reported that fractures were most commonly seen in the distal of the forearm (26%), phalanges (16%), and clavicle (9%)[6]. Worlock and Stower[9] reported in their study in England that the most common fracture site was the distal of the

forearm (36%)[9]. Our findings were similar to the results of these studies, with fractures most commonly seen in the humerus (40.2%), wrist (25.8%), and foot (12.7%) (Table V). However, we decided to consider the forearm and arm as one fracture area due to the fact that data was collected with a retrospective questionnaire which was dependent on the memory of the subjects. In our study, some of the fractures defined as arm or wrist fractures were evaluated as fractures of the forearm and distal radius (Table V).

Fractures are an important public health problem in our country and are much more expensive than their prevention, even though the cost of prevention is generally greatly underestimated. There is need for some studies in order to determine the magnitude of the problem.

An important percentage of the Turkish population utilize bonesetters (26.8%) who treat fractures in ignorance. In order to prevent possible problems in treatment, necessary precautions should be taken, the first being education. To improve public health, more importance should be given to precautions about accidents, and injuries that might result from them, and to fighting chronic and infectious diseases. In this way, fractures, and the physical disabilities that might result from them, will also be prevented.

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