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Epidemiology of accidents among children in agriculture

Epidemiologia wypadków wśród dzieci w rolnictwie

In Poland over one third of accidents in agriculture are related to using farm machinery, devices or tools, among which the most frequent cause are potato-planting machines (13%) and tractor trailers (10%). The statistics show that every second child engaged in the farm work rides a tractor, carries heavy objects, every third child cuts straw and hay with chaff-cutters, cultivates the fields with a tractor and plants potatoes with planting machines. Every fifth child takes part in the threshing of corn, the slaughter of the cattle and cutting the wood with a circular saw. The threats to the children's health result most often from safety negligence, haste and carelessness, which are difficult to avoid.

Introduction

The engagement of children in the farm work can be active, involving direct performing the tasks and passive, connected with the stay in the area of works frequently harmful to health.

The engagement of children in the farm work is common [1,2], although this type work is hard and dangerous. It is reflected by high incidence rate of fatal accidents which is over three-fold higher than in other branches of economy [4]. Moreover, the specificity of agricultural production lies not only in seasonal intensification of work, but also in its seasonal differentiation. The highest number of children is employed in the farm work in autumn [2]. At that time only 4.9% of children do not perform any work on the farms, in summer only 5.6% and in spring 7.7%. Winter is the period of the lowest professional activities, also among children since 38.5% of them are not engaged in any farm work [2]. Engaging children in agricultural work is also related to the legal regulations. Article 90 of the family and custody code says that "a child who is supported by parents and lives at their place is obliged to help them in their common household". There is a list of works which are not allowed to be performed by children, nevertheless the above mentioned code, in some way, approves of the engagement of children be-

W Polsce około jedna trzecia wypadków w rolnictwie jest spowodowana maszynami, narzędziami a najczęściej sadzarkami do ziemniaków (13%) i jazdą traktorem (10%). Statystyki wykazały, że w pracy rolniczej jest zaangażowane co drugie dziecko w gospodarstwie – jeżdżą na traktorze, noszą ciężkie przedmioty. Co trzecie dziecko bierze udział w cięciu słomy i siana z użyciem maszyn tnących, jeździ na traktorze podczas wykonywania pracy przy roślinach uprawnych, czy sadzeniu ziemniaków z użyciem maszyn. Co piąte dziecko pomaga w młóceniu zboża, uboju bydła, wyrębie lasu i pracy z piłą tarczową. Największe zagrożenia dla zdrowia dzieci wynikają często z zaniedbywania bezpieczeństwa, pośpiechu i niedbalstwa, które są trudne do uniknięcia.

low 16 years of age in the work on their parents' farm [3].

In Poland, like in other countries, accidents among children and adolescents aged between 1-24 years constitute the main cause of death, outnumbering malignancies and circulatory diseases [1]. In rural Poland about 12,500 farmers are subjected to accidents annually of which only about one thousand (approximately 10%) are reported to KRUS.

Aim of study

The aim of our study is to present and evaluate the problem of injuries to the musculoskeletal system sustained by children at their work on a farm.

Material and methods

The study group included a total of 70 children (56 boys and 14 girls) aged up to 15 years from six counties of Małopolska province. The material was obtained thanks to the kindness of KRUS in the years 2003-2005. All accidents in agriculture which involved children up to 15 years of age were divided into two groups: those related to using of farm machinery and those without the use of farm machinery. The accidents related to using of machinery also included knocking down, seizing by a working machine or crushing by a moving vehicle. In

our evaluation, the following factors were taken into consideration, season, proportion of girls and boys, range of children's age and the injured part of the body.

Results

All accidents in agriculture which involved children were divided into two main groups: those with the use of machinery and those without the use of machinery. The proportion of the casualties in these two groups is presented by table I.

Table I
The rate of accidents with the use of machinery and without the use of machinery.

| Accidents | Number of patients |
|-------------------|--------------------|
| With machinery | 20 (28.6%) |
| Without machinery | 50 (71.4%) |

The table above shows that about 30% of accidents were related to using of farm machinery. The most frequent causes of this type of accidents in our material were falls from trailers (25%), accidents related to using a potato-planting machine and a chaff-cutter (15% each) (table II).

Table II
Causes of injuries related to using of farm machinery in the years 2003-2005.

| Type of machinery | Number of patients |
|-------------------------------|--------------------|
| Potato-planting machine | 3 (15%) |
| Circular saw | 2 (10%) |
| Chaff-cutter | 3 (15%) |
| Axe | 2 (10%) |
| Running over by a straw-press | 1 (5%) |
| Running over by a tractor | 1 (5%) |
| Knocking down by a car | 2 (10%) |
| Fall from a trailer | 5 (25%) |
| Fall from a combine harvester | 1 (5%) |
| Total | 20 (100%) |

About 70% of accidents were not related to using of farm machinery, the most common of which were falls on the same level (38%), falls from a higher level (24%), usually from a ladder (table III).

The analysis showed that the parts of the body which are at the greatest risk of being injured are the forearm (24.3%) and the hand (20%). The lower limbs were three-fold less frequently injured (table IV). Among injuries to the forearm, the most common were fractures of the radial bone (over 90%). The injuries to the hand

Table III
Causes of injuries not related to using of farm machinery.

| Type of injury | Number of patients |
|-------------------------------------|--------------------|
| Stumble | 19 (38%) |
| Fall from a bicycle | 6 (12%) |
| Fall from a higher level | 12 (24%) |
| Injury to the hand in the door/gate | 3 (6%) |
| Crushing by an object | 4 (8%) |
| Battering by a cow | 1 (2%) |
| Burn | 2 (4%) |
| Fall from a tree | 2 (4%) |
| Biting by a dog | 1 (2%) |
| Total | 50 (100%) |

Table IV
The rate of injuries to various parts of the body in the years 2003-2005.

| Injuries to various parts of the body | Year 2003 | Year 2004 | Year 2005 |
|---------------------------------------|-----------|-----------|-----------|
| Head (concussion, fracture) | 4 | 0 | 1 |
| Clavicle (fracture) | 1 | 1 | 2 |
| Arm (fracture) | 4 | 0 | 5 |
| Forearm (fracture) | 5 | 6 | 6 |
| Hand (injury, fracture) | 4 | 4 | 6 |
| Abdomen | 0 | 0 | 1 |
| Pelvis | 0 | 0 | 1 |
| Thigh (fracture) | 2 | 1 | 0 |
| Knee (sprain) | 0 | 0 | 1 |
| Leg (fracture) | 3 | 2 | 0 |
| Foot (fracture) | 1 | 1 | 2 |
| Burns | 0 | 1 | 1 |
| Deaths | 1 | 1 | 0 |
| Multi-organ injuries | 1 | 1 | 0 |
| Total | 26 | 18 | 26 |

Table V
The incidence of farm accidents among children related to the season of the year.

| Year | Months | | | | | | | | | | |
|-------|--------|----|-----|----|---|----|-----|------|----|---|----|
| | I | II | III | IV | V | VI | VII | VIII | IX | X | XI |
| 2003 | 0 | 1 | 1 | 5 | 1 | 2 | 4 | 5 | 1 | 3 | 0 |
| 2004 | 0 | 1 | 1 | 1 | 0 | 3 | 1 | 5 | 5 | 1 | 1 |
| 2005 | 1 | 0 | 0 | 1 | 3 | 0 | 6 | 6 | 5 | 1 | 1 |
| Total | 1 | 2 | 2 | 7 | 4 | 5 | 11 | 16 | 11 | 5 | 2 |

included 6 amputations of the fingers, 5 fractures and 3 crush injuries without damage to the internal structures (table IV).

Evaluation of the seasonal character of the work in agricultural showed that the greatest number of accidents occurred in August and September (table V).

Among the injured children, boys constituted 80% (table VI) and the rate of injuries related to using of machinery was 25.7%, outnumbering ten-fold the quantity of girls having accidents (table VII).

Taking into account children's age, it was found that highest accident rate was among children aged 13-15 years (41%). Moreover, children in this age range had

the greatest number of accidents related to using of the farm machinery (table VIII).

The age of children who underwent accidents in the years 2003-2005 was 10 (table IX).

Table VI
The number of boys and girls suffering injuries in particular years.

| Year | Boys | Girls |
|-----------|------------|----------|
| Year 2003 | 21 (30%) | 5 (7.1%) |
| Year 2004 | 15 (21.4%) | 3 (4.3%) |
| Year 2005 | 20 (28.6%) | 6 (8.6%) |
| Total | 56 (80%) | 14 (20%) |

Table VII
Proportion of boys and girls in accidents with and without the use of machinery.

| Accidents | Boys | Girls | Total |
|--------------------------------|------------|------------|-------|
| Related to using machinery | 18 (25.7%) | 2 (2.8%) | 20 |
| Not related to using machinery | 38 (54.3%) | 12 (17.2%) | 50 |
| Total | 56 (80%) | 14 (20%) | 70 |

Table VIII
The number of children in various age range.

| Year | Age range | | | |
|-------|-----------|-----------|------------|------------|
| | 0-6 | 7-9 | 10-12 | 13-15 |
| 2003 | 6 | 5 | 5 | 9 |
| 2004 | 2 | 2 | 6 | 10 |
| 2005 | 6 | 2 | 7 | 10 |
| Total | 4 (20%) | 9 (12.8%) | 18 (25.7%) | 29 (41.5%) |

Table IX
Mean age of children in particular years.

| Year | Mean age (years) |
|------|------------------|
| 2003 | 10.2 |
| 2004 | 12.4 |
| 2005 | 10.5 |

Discussion

The majority of farm families are of traditional rural nature with typical for rural area economic functioning. It means that each of family members is engaged in an active way in farm work, namely the production of crops designed for sale. In the rural areas, children are traditionally engaged in the farms work.

In Poland over one third of all accidents in agriculture are the ones related to using of farm machinery, farm devices and tools. The most common accidents are related to the use of potato-planting machines (13%) and tractors (10%) [1]. The statistics show that among children working on farms, every second rode a tractor, carried heavy objects, every third cut the straw or hay with a chaff-cutter, cultivated the land with a tractor, or planted potatoes with a potato-planting machine. Every fifth child was engaged in threshing of corn, slaughter of the cattle, cutting of the wood with a circular saw [2].

Evaluation of the material provided by KRUS revealed that one third of accidents among children was related to using of farm machines, mainly tractor trails

and potato-planting machines. This is confirmed by other authors [1]. The accidents not related to using of farm machines most often resulted from falls on the same level (about 40%), which was not reported by other authors [1].

In the present study, 80% of children engaged in the farm work with the use of farm machinery were boys aged 13-15 years. Mean age range of children having accidents was 10-12 years. Two fatal accidents were noted: one child was knocked down by a car, the second child was run over by a tractor. In Poland several fatal accidents are reported annually. The majority of them occur during a ride on a tractor or its operating [1]. In this period of time two cases of multiple-organ injuries related to using of machinery were reported. In one, the child was knocked down by a car, which resulted in fracture of the femur and brain concussion; in the second, the child was run over by a tractor trail, which resulted in fracture of the clavicle and pelvic bone.

The presented material shows that the parts of the body which run the greatest risk of being injured are the upper extremities, especially the hands and forearms,

which correlates with the data from literature [1, 2]. The most common injuries were fractures of the forearm bones, that is, the ulna and radius (24.3%).

The increase in the number of accidents among children in July, August and September was related to intensification of the farm work at that time. For the last several years preventive efforts to avoid accidents among children have been taken by providing examples of safe behaviour. However, the greatest role is played by parents whose behaviour is imitated by children. Threats to the children's health result most often from incompetence, disobeying safety rules, haste and carelessness, which are difficult to counteract.

Conclusions

1. Accidents in agriculture most often occur among children aged 13-15 years.
2. Boys constitute 80% of children engaged in the farm work.
3. The upper limbs are most commonly affected by injuries.
4. Accidents related to using of farm machinery involved tractor trails, potato-planting machines and chaff-cutters.
5. Falls on the same level were the most common cause of accidents not related to farm machinery use (80% of all accidents).
6. The highest rate of accidents is in July, August and September.

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