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# CAUSES AND CONSEQUENCES OF HEAD INJURIES AMONG RURAL INHABITANTS HOSPITALISED IN A MULTI-ORGAN INJURY WARD. II. CIRCUMSTANCES, TYPES AND CONSEQUENCES OF HEAD INJURIES

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**Abstract:** The scope of problems concerning head injuries was investigated among rural patients, compared to urban population, from the aspect of their incidence in both populations, as well as an attempt to perform a multi-variable analysis of socio-demographic and geographical risk factors for each of the analysed traits concerning the injury. The study group were patients treated in the Multi-Organ Injury Ward, at Cardinal Stefan Wyszyński Regional Hospital in Lublin during the period 1999–2002. The study covered 265 patients. The group of rural inhabitants covered 34% of the total population in the study. The most frequent circumstances of the injury sustained, both among rural and urban patients, was a road accident with the patient either as a passenger or a pedestrian, observed in 30.6% of the total number of people in the study. Female gender was an injury risk factor. The second position among circumstances of injuries was occupied in both sub-populations by road accident with the patient as the driver – this concerned 23% of the total number of patients in the study, and the risk factors were: male gender, place of residence in rural area and better educational status. The majority of patients sustained an injury in the street, with similar frequency among rural and urban inhabitants. Rural patients, significantly more often than urban inhabitants, sustained injuries at home and in the courtyard. The most frequent type of an injury sustained was cerebral concussion, which was noted twice as frequently among urban (59.9%) than rural inhabitants (31.1%). The risk factors of cerebral concussion were: urban place of residence, female gender, and younger age of a patient. Injuries of mesencephalon were placed in the second position with respect to the frequency of occurrence, and more often concerned rural (46.7%) than urban (24.6%) patients. The risk factors for this injury were: living in a rural area, and older age in males. Concomitant injuries were observed in 50% of rural patients and in 57.1% of urban inhabitants. The consequences of injuries in various forms were observed in 87.8% of rural inhabitants, and in a similar percentage of urban patients. Age turned out to be the risk factor for the appearance of the negative consequences of the injury. This was also the risk factor of death during treatment, and in balance disorders.

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## INTRODUCTION

Injuries and poisonings are among the main health and social problems in Poland. They are an important cause of the increase in the number of the disabled, both among rural and urban inhabitants [4, 5, 10]. Injuries and poisonings occupy the third position among the causes of death in Poland, preceded by cardiovascular diseases and cancer [6].

Injuries most often take place due to road accidents, accidents at work, as well as in schools and other educational

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institutions, places for exercising sports and recreation areas, also while undertaking suicidal attempts and murder. It is worth emphasizing that the problem of accidents and injuries at home, which is sometimes underestimated, is the location where the number of accidents increases every year [2, 7]. One of the main causes of the increase in accident rates, and consequently injuries in rural areas, is the progress of mechanization and motorisation, which is not simultaneously accompanied by an equally dynamic development of education in the field of work safety and hygiene, as well as health education. Here, the pace of the development and modernisation of the road infrastructure is important, which is too slow in relation to the increasing needs. The use of chemicals in agriculture, in turn, contributes to an increase in the number of poisonings in rural areas.

Various studies indicate that rural inhabitants most often sustain injuries of the extremities, head, multi-site injuries, as well as injuries of the chest and spine [3]. Among the above-mentioned injuries, head injuries are severe and result in serious effects, including temporary (short-term, long-term) or permanent disability, and frequently these injuries are the cause of death. As early as the 90s, the National Health Injury Foundation (NHIF) referred to head injuries as a 'quiet epidemic', due to the considerable underestimation of their occurrence.

The majority of patients who had undergone head injury required a longer or shorter, usually expensive treatment, according to the severity of injury, consequences and duration, while nearly all patients needed rehabilitation. Apart from health effects, injuries and their consequences also constitute a serious financial burden, both on the State budget and on the families of the victims.

The importance of actions associated with health promotion and prophylaxis for the reduction in the frequency of injuries, accidents and poisonings is emphasized [1, 11, 12]. Epidemiological studies indicate an insufficient scope and efficiency of these actions, especially in the rural environment.

## OBJECTIVES

Among the data concerning head injuries, the circumstances and place of injury was taken into account, as well as types of head injuries, types of concomitant injuries, and the consequences of the injuries sustained. Two main goals were posed in the analyses of the above-mentioned variables. Firstly, the determination of the frequency of the variables analysed in the populations of rural and urban patients, the total population of patients in the study, and evaluation of the differences between rural and urban inhabitants. Secondly, a multi-variable analysis of socio-demographic and geographical risk factors for each trait concerning an injury examined. The following factors were considered: gender, age, patients' education level, and place of residence.

## MATERIAL AND METHODS

The study covered patients of the Cardinal Stefan Wyszyński Regional Hospital in Lublin, hospitalised for a period longer than 24 hours in the Multi-Organ Injury Ward due to head injury, during the period 1999–2002. All hospital medical documents were analysed in the form of the records of patients who were treated within the above-mentioned period of 4 years, from which 265 people with head injury as an ultimate diagnosis in the Patient Medical Record and Information Chart, were selected for the study. The population examined covered 204 males (77.0%) and 61 females (23.0%). The group of rural inhabitants was 90 people, i.e. 34.0% of the patients in the study (82.2% males and 17.8% females). The study was of a retrospective character, therefore to this study were qualified patients with an ultimate medical diagnosis of head injury according to the Patient Medical Record, and were hospitalised for a period longer than 24 hours. Information concerning the patients was collected with the use of a specially designed questionnaire form: the Scientific-Research Protocol.

**Preparation of data for analyses.** The variables in the study were categorised within a relatively small number of categories.

The circumstances of injuries were categorised into 8 groups: ① road accident with the patient as a driver of the vehicle; ② road accident with the patient as a passenger or a pedestrian as a victim of an accident; ③ fall as a result of stumbling or slipping; ④ fall from a height; ⑤ fainting; ⑥ assault; ⑦ being struck with a hard object; ⑧ crushing, and others.

Information concerning the place of injury was handled in 3 categories: ① injuries at home and in the courtyard; ② injuries in the street; ③ injuries in other places (place of work, forest, public places and institutions – bus stop, airport, racecourse).

The variables concerning types of injuries, types of concomitant injuries and consequences were multiple variables, i.e. 1 patient could have sustained several injuries, possessed several concomitant injuries, and might have experienced several consequences of injuries. Based on the above-mentioned variables, the variables of disjoint categories were created. The qualification of multi-injury (multi-symptom) patients into one of the categories was carried out on a computer. For each of the variables mentioned, the hierarchy of the priority of qualification of patients to individual categories was established, and on this basis the coding procedures developed.

The categorisation of the types of injuries was as follows: ① injuries of the mesencephalon; ② fractures of the cranial base; ③ cerebral concussion; ④ fractures of the cranial integument; ⑤ head injuries with wounds requiring surgical dressing. The above-mentioned categories of injuries were numbered according to the hierarchy of the priority of ascribing to multi-injury patients. Thus, Category 1

was ascribed to all patients with injuries of the mesencephalon, Category 2 – to all patients with the fractures of the cranial base, excluding those who had injuries of the mesencephalon, etc.

The following concomitant injuries were distinguished: ① distortions of the cervical spine; ② injuries to the chest; ③ injuries to the abdomen; ④ injuries in the region of the upper extremities and the shoulder girdle; ⑤ injuries in the region of the lower extremities, the pelvic girdle and the spine. The categories of injuries were ascribed according to the hierarchy of priority to multi-injury patients. An additional principle, in the case of injuries to the chest and abdomen, was the priority of severe forms of these injuries over the light ones (patients with a severe form of injury to the abdomen and a light form of chest injury were ascribed the category of abdominal injury).

The categorisation of the consequences of head injuries was as follows: ① death during treatment; ② epilepsy; ③ balance disorders, ④ headaches; ⑤ neurological symptoms (to this category were qualified patients without the symptoms of categories 1–4, showing various symptoms from among of the following: neurological symptoms of the right hand, memory disorders, hyper-excitability, nervousness, motor disorders, spine pains. The categories were numbered as before – according to the priority of ascribing to multi-injury patients.

**Statistical analyses.** Statistical analyses were conducted by means of the SPSS/PC v. 12 statistical package. In univariate comparisons the unadjusted differences between rural and urban patients were evaluated. These analyses were carried out by means of chi-square test, or, in case of small numbers – by Fisher's exact test [9]. The significance of the differences was evaluated for each category of an individual variable separately, and presented in the 'p Value' column in Table 1.

In multi-variable analyses the effect was evaluated of, adjusted for other variables, several factors: gender, age, education level, and place of residence on the probability of the occurrence in the population of patients examined of individual categories of the variables analysed. The analysis of logistic regression was adopted as the method [8]. Stepwise regression with backward elimination was applied. The analysis concerning each individual dependent variable was divided into 2 phases. In the first phase, the model contained 2 independent variables: gender (0 – females, 1 – males) and age (continuous variable). The variables significant in this phase were used in the second phase, while non-significant variables were eliminated. In the second phase, the independent variables were: place of residence (0 – urban, 1 – rural), education (0 – worse educated: elementary, vocational; 1 – better educated: secondary school and university), and additionally, the significant variables from the first phase. At the subsequent steps, iteratively non-significant variables were eliminated from the model. Ultimately, the model contained only the significant variables or no variables, if all of them were non-significant. Table 2 presents the results of analyses, and contains only the variables significant for a given dependent variable – the odds ratio, and its 95% CI, for each independent variable, and evaluation of the significance of effects. Odds ratios for age were calculated per 10 years of life.

The level of significance was established at $p<0.05$.

## RESULTS

In the population examined the most frequent circumstances of injuries were road accidents. Accidents with the patient as a passenger or pedestrian constituted 30.6% of the total circumstances of injuries, whereas those where the patient was the driver of the vehicle – 23.4% (Tab. 1). Road accidents covered jointly 54.0% of the circumstances of accidents. Approximately twice more rarely were falls as a result of slipping or stumbling (14.3%), and falls from a height (14.0%), which constituted 28.3% of the circumstances of injuries. The above-mentioned circumstances occurred with a similar frequency among rural and urban patients. Assault was the circumstance of 11.7% of injuries, and concerned 4.4% of rural patients, and almost 3 times more often (15.4%) – urban patients ($p<0.01$). The following circumstances were rarely observed: fainting (2.3%), being crushed, struck by a hard object (1.9% each) (Tab. 1).

The analysis of logistic regression showed that the chance of injury while driving a vehicle was nearly 9 times higher when the driver was male, and decreased significantly in males with age (Tab. 2). This chance was 2.6 times higher in patients living in rural than urban areas, and 3.16 higher in patients with secondary school and university education, compared to those who were worse educated. The threat of injury as the result of an accident with the patient as a passenger was by 3.85 times higher in females than males. The risk of injury as a result of slipping and stumbling significantly increased with age (Tab. 2), and was higher in urban than rural areas.

The majority of the patients in the study – 62.6% – sustained an injury in the street – 58.9% of rural patients and 64.6% of urban inhabitants. As many as 26% of injuries occurred at home and in the courtyard – significantly more often in rural than urban patients (34.4% and 21.7% respectively; $p<0.05$). The remaining 11.3% of accidents occurred in other places (Tab. 1).

The analysis of logistic regression showed that the risk of injury at home was about 2.6 times higher among worse educated people than among those better educated, whereas the risk of injury in the street was 1.7 times higher among better than worse educated patients; in addition, it was confirmed that the risk of injury at home increased with age, while the risk of injury outside the home decreased (Tab. 2).

Cerebral concussion occupied the first position among injuries, and was more frequently noted among urban than

**Table 1.** Circumstances of injury, place of injury, type of head injury sustained, concomitant injuries and consequences of head injuries among rural, urban patients and in the total group (counts, percents, and p-values of chi$^2$ differences between rural and urban patients calculated separately for each category).

| Variable | Rural patients n (%) | Urban patients n (%) | Total n (%) | p-value |
|---|---|---|---|---|
| N/A[A] | 90 (34) | 175 (66) | 265 (100) | N/A |
| Circumstances of injury | | | | |
| Road accident, patient as a driver | 25 (27.8) | 37 (21.1) | 62 (23.4) | 0.227 |
| Road accident, patient as a passenger or pedestrian | 29 (32.2) | 52 (29.7) | 81 (30.6) | 0.675 |
| Slipping, stumbling | 11 (12.2) | 27 (15.4) | 38 (14.3) | 0.481 |
| Fall from height | 14 (15.6) | 23 (13.1) | 37 (14.0) | 0.592 |
| Assault | 4 (4.4) | 27 (15.4) | 31 (11.7) | 0.008 |
| Fainting | 2 (2.2) | 4 (2.3) | 6 (2.3) | – [C] |
| Being crushed and others | 3 (3.3) | 2 (1.1) | 5 (1.9) | – [C] |
| Being hit with a hard object | 2 (2.2) | 3 (1.7) | 5 (1.9) | – [C] |
| Place of injury | | | | |
| At home and in the courtyard | 31 (34.4) | 38 (21.7) | 69 (26) | 0.03 |
| In the street | 53 (58.9) | 113 (64.6) | 166 (62.6) | 0.37 |
| Other places | 6 (6.7) | 24 (13.7) | 30 (11.3) | 0.09 |
| Type of head injury sustained | | | | |
| Injuries of the mesencephalon | 42 (46.7) | 43 (24.6) | 85 (32.1) | 0.0003 |
| Fractures of the bones of the cranial base | 17 (18.9) | 26 (14.9) | 43 (16.2) | 0.40 |
| Cerebral concussion | 28 (31.1) | 89 (50.9) | 117 (44.2) | 0.002 |
| Fractures of the skull integument | 1 (1.1) | 10 (5.7) | 11 (4.2) | 0.10[B] |
| Head injuries with wounds needing surgical dressing | 2 (2.2) | 7 (4) | 9 (3.4) | 0.72[B] |
| Types of concomitant injuries | | | | |
| Patients with concomitant injuries diagnosed | 45 (50.0) | 100 (57.1) | 145 (54.7) | 0.27 |
| Distortions of the cervical spine | 10 (22.2) | 28 (28.0) | 38 (26.2) | 0.46 |
| Injuries of the chest | 10 (22.2) | 24 (24.0) | 34 (23.4) | 0.82 |
| Injuries of the abdomen | 5 (11.1) | 9 (9.0) | 14 (9.7) | 0.76[B] |
| Injuries in the region of upper extremities and shoulder girdle | 6 (13.3) | 14 (14.0) | 20 (13.8) | 0.91 |
| Injuries in the region of lower extremities, pelvic girdle and spine | 14 (31.1) | 25 (25.0) | 39 (26.9) | 0.44 |
| Types of consequences of head injuries | | | | |
| Patients with consequences of head injuries | 79 (87.8) | 146 (83.4) | 225 (84.9) | 0.35 |
| Death during treatment | 16 (20.3) | 18 (12.3) | 34 (15.1) | 0.11 |
| Epilepsy | 8 (10.1) | 18 (12.3) | 26 (11.6) | 0.62 |
| Balance disorders | 33 (41.8) | 53 (36.3) | 86 (38.2) | 0.42 |
| Headaches | 17 (21.5) | 41 (28.1) | 58 (25.8) | 0.28 |
| Neurological symptoms | 5 (6.3) | 16 (11.0) | 21 (9.3) | 0.25 |

[A] N/A – Not Admissible; [B] Fisher's exact test; [C] Calculations not performed due to small population numbers.

rural patients (50.9% and 31.1%, respectively; p<0.005), followed by the injuries of mesencephalon, which occurred more frequently among rural than urban inhabitants (46.7% *vs* 24.6%; p<0.001) (Tab. 1). The subsequent positions were occupied by fractures of the bones of the cranial base, which was non-significantly more often observed in rural patients (18.9%), compared to urban inhabitants (14.9%). The 2 remaining types of injuries occurred in few patients: fractures of the bones of the cranial integument – in 4.2% of the total number of patients in the study, whereas head injuries with wounds requiring surgical dressing – in 3.4%.

Based on the analysis of logistic regression, it was noted that the risk of cerebral concussion was higher in females than males, and was also twice as high among urban than rural patients; this risk decreased with age (Tab. 2). Considering the injuries of the mesencephalon, the risk of their occurrence was 2.9 times higher among rural than urban inhabitants; this risk significantly increased with age among males, while insignificantly among females.

Concomitant injuries were observed in 54.7% of the total number of patients, non-significantly more frequently in urban than rural patients – 57.1% and 50.0%, respectively.

**Table 2.** Results of logistic regression models with single category of circumstances of injury, place of injury, type of head injury sustained, concomitant injuries and consequences of head injuries as dependent variable. Significant odds ratios, 95% C.I. and p-values for independent variables in the given model.

| Variable | O.R. | 95% C.I. | | p-value |
|---|---|---|---|---|
| Significant independent effect | | Lower | Upper | |
| Circumstances of injury[A] | | | | |
| Road accident, patient as a driver | | | | |
| Males *vs* females | 8.95 | 2.97 | 26.98 | 0.0001 |
| Males with age | 0.66 | 0.53 | 0.83 | 0.0002 |
| Rural patients *vs* urban patients | 2.61 | 1.31 | 5.21 | 0.006 |
| Better *vs* worse educated | 3.16 | 1.62 | 6.18 | 0.0008 |
| Road accident, patient as a passenger or pedestrian | | | | |
| Males *vs* females | 0.26 | 0.14 | 0.48 | 0.00002 |
| Slipping, stumbling | | | | |
| Age | 1.55 | 1.26 | 1.91 | 0.00004 |
| Rural patients with age | 0.85 | 0.73 | 0.99 | 0.03 |
| Hitting | | | | |
| Rural patients *vs* urban patients | 0.25 | 0.09 | 0.75 | 0.01 |
| Place of injury[B] | | | | |
| At home and in the courtyard | | | | |
| Age | 1.36 | 1.16 | 1.60 | 0.0001 |
| Better *vs* worse educated | 0.39 | 0.21 | 0.73 | 0.004 |
| In the street | | | | |
| Age | 0.81 | 0.70 | 0.93 | 0.003 |
| Better *vs* worse educated | 1.70 | 1.00 | 2.89 | 0.049 |
| Type of head injury sustained[C] | | | | |
| Injuries of the mesencephalon | | | | |
| Males with age | 1.21 | 1.07 | 1.37 | 0.003 |
| Rural patients *vs* urban patients | 2.90 | 1.58 | 5.32 | 0.0006 |
| Cerebral concussion | | | | |
| Males *vs* females | 0.29 | 0.16 | 0.55 | 0.0001 |
| Age | 0.83 | 0.72 | 0.96 | 0.01 |
| Rural patients *vs* urban patients | 0.51 | 0.29 | 0.90 | 0.02 |
| Concomitant injuries[D] | | | | |
| Presence/absence of concomitant injuries | | | | |
| Age | 0.86 | 0.75 | 0.99 | 0.03 |
| Better *vs* worse educated | 2.22 | 1.32 | 3.73 | 0.003 |
| Consequences of head injuries[E] | | | | |
| Presence/absence of consequences of head injuries | | | | |
| Age | 1.24 | 1.02 | 1.52 | 0.03 |
| Death during treatment | | | | |
| Age | 1.26 | 1.04 | 1.53 | 0.02 |
| Balance disorders | | | | |
| Age | 1.20 | 1.05 | 1.39 | 0.02 |

[A] Model with the dependent variable: 'Fall from height' did not show a significant effect of any of the independent variables. For the category 'Fainting', 'Being crushed and others', and 'Being struck with a hard object' the analyses were not performed due to the small number of positive cases.
[B] Model with the dependent variable 'Other places of injury' did not show a significant effect of any of the independent variables considered.
[C] Model with the category 'Fractures of the bones of the cranial base' as a dependent variable did not show a significant effect of any of the independent variables considered. For the category 'Fractures of bones of the cranial integument', and 'Head injuries with wounds requiring surgical dressing' the analyses were not performed due to the small number of positive cases. [D] None of the models containing the category of concomitant injuries as a dependent variable showed a significant effect of any of the independent variables considered. [E] Models with the categories of consequences 'Epilepsy', 'Headaches', and 'Neurological symptoms' as a dependent variable did not show a significant effect of any of the independent variables considered.

Individual types of injuries were noted with a similar frequency in rural and urban patients. Among the total number of the patients examined the most frequent injuries were: injuries in the region of lower extremities, pelvic girdle and spine (26.9%), distortion of the cervical spine (26.2%), and chest injuries (23.4%). Injuries in the region of the upper extremities and the shoulder girdle (13.8%) and injuries of the abdomen (9.7%) were more rarely noted.

Analysis of logistic regression showed that the chances of the occurrence of concomitant injuries were twice as high among patients who had at least secondary school education level than in those who were worse educated, and decreased with age. No significant effect was confirmed of any of the demographic variables on the probability of the occurrence of a specified type of these injuries.

The consequences of head injuries in various forms were observed in 84.9%of patients, with a similar frequency, irrespective of the place of residence. Among the patients in whom these consequences were noted, disturbances of balance were most frequent – in 38.2% of patients, followed by headaches – observed in 25.8% of patients. Death during the course of treatment was noted in 15.1% of patients, nearly twice as often in rural than urban patients (20.3% and 12.3%, the difference close to statistically significant value). Epilepsy was diagnosed in 11.6% of the population examined, with a similar frequency among rural and urban patients. Various neurological symptoms were observed in 9.3% of patients, non-significantly more often in urban than rural inhabitants (11.0% and 6.3%, respectively).

Logistic regression analyses indicated a negative effect of age on the probability of occurring negative consequences of the injury sustained, especially the relative risk of death during the course of treatment increased with age, as well as the risk of the occurrence of balance disorders.

## DISCUSSION

Among the differences between rural and urban patients, a spectacular result was a nearly three times higher risk observed in rural than urban patients of sustaining an injury associated with driving a vehicle. This may be an alarming sign of the low level of road safety on rural roads and communication arteries passing through villages, which may result from both the worse technical state of roads in rural areas, and a lower discipline among the rural population with respect to the observance of traffic regulations. An alternative explanation, however, may be the effect of selection in the admittance of rural patients to hospital. Possibly, people living in rural areas who suffered head injuries as a result of a road accident significantly more often were transported to a hospital in Lublin, compared to those who sustained other types of injury and were admitted to provincial hospitals, closer to their place of residence.

The subsequent, very important result noted was a higher risk of sustaining an injury of the mesencephalon among rural than urban patients. The fact remains, for the explanation whether this result is an evidence of the actual, higher frequency of occurrence of this type of severe injury in rural rather than urban areas, or it can be explained similarly to the above-mentioned – by the effect of the selection while admitting rural patients to hospital.

Rural patients with head injuries differed from urban patients with respect to only 2 circumstances of head injuries and their 2 types, as well as, to a smaller degree, the frequency with which they were injuries sustained at home and in the courtyard; however they did not differ by the types of concomitant injuries and the consequences of injuries. Despite this fact, the 2 differences mentioned above evidencing an unfavourable situation of rural patients, are associated with serious implications with respect to the risk of injury while driving a vehicle, or sustaining an injury of the mesencepalon. Firstly, these differences suggest the necessity of undertaking urgent actions on behalf of improvement of the quality of the road infrastructure in rural areas, and secondly, undertaking actions biased towards an improvement of the driving culture and discipline in the observance of road regulations by the road users in rural areas – especially addressed to young males. Thirdly, an important task concerns educational activities with respect to the observance of the principles of occupational safety in order to reduce severe head injuries in rural environments.

The fact that the presented studies are based on data from one of the city hospitals weakens the possibilities to refer the effect of these results to the total population in the Lublin Region. In order to verify the results of the studies it would be desirable to undertake studies based on hospital statistics concerning the victims of head injuries from randomly selected hospitals in the whole Lublin Region.

## CONCLUSIONS

1. The most frequent circumstances of the injury sustained, among both rural and urban patients, was a road accident with the patient either as a passenger or a pedestrian, observed in 30.6% of the total number of people in the study. Female gender was an injury risk factor. The second position among circumstances of injuries was occupied in both sub-populations by road accident with the patient as a driver – this concerned 23% of the total number of patients in the study, and the risk factors were as follows: male gender, place of residence in rural area and better educational status. This risk decreased with age in males. In general, road accidents of both above-mentioned types were the most frequent circumstance of injuries, covering 53.9% of the patients examined. Injuries as a result of stumbling and slipping constituted 14.3%, while their risk significantly increased with age, to a higher degree in urban than rural areas. Rural place of residence was connected with a lower than in urban areas risk of injury as the result of assault, which in rural areas was noted in 4.4% of patients, while in urban areas – in 15.4%.

2. The majority of patients sustained an injury in the street, with similar frequency among rural and urban inhabitants (58.9% and 64.6%, respectively). Rural patients, significantly more often than urban inhabitants, sustained injuries at home and in the courtyard (34.4% and 21.7% respectively). The risk of suffering an injury at home increased with age, while the risk of injury outside the home decreased.

3. The most frequent type of injury sustained was cerebral concussion, which was noted twice more frequently among urban than rural inhabitants – 59.9% and 31.1%, respectively. The risk factors of cerebral concussion were as follows: urban place of residence, female gender, and younger age of a patient. Injuries of the mesencephalon were placed in the second position with respect to the frequency of occurrence, and more often concerned rural than urban patients (46.7% and 24.6%, respectively). The risk factors of mesencephalon injury were: living in a rural area, and older age in males. The subsequent position was occupied by fractures of the bones of the cranial base, occurring with a similar frequency in patients living in rural and urban areas (18.9% and 14.9%).

4. Concomitant injuries were observed in 50% of rural patients and in 57.1% of urban inhabitants. Also, the individual types of injuries were noted with a similar frequency among rural and urban patients. In the population examined, the most frequent injuries concerned: lower extremities, pelvic girdle and the spine (26.9%), followed by distortion of the cervical spine (26.2%), and injuries to the chest (23.4%).

5. The consequences of injuries in various forms were observed in 87.8% of rural inhabitants, and in a similar percentage – as many as 83.4% of the urban population. The most frequent form of these consequences were balance disorders (38.2%) and headaches (25.8%). In 15.1% of the patients examined, death occurred during the course of treatment. Age turned out to be the risk factor for the appearance of the negative consequences of the injury experienced. This was also the risk factor of death during treatment, and in balance disorders.

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