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DAMAGE ASSOCIATED WITH THE USE OF BABY WALKERS

© ***A.N. Sharov[1], A.V. Krivova[1], S.S. Rodionova[2], V.P. Zakharov[1]***

[1] Tver' State Medical University, Tver', Russia;
[2] N.N. Priorov Central Research Institute of Traumatology and Orthopedics, Moscow, Russia

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This article presents an overview of 40 literary sources regarding injuries caused by baby walkers. The data from the first studies on the submitted subjects (1981) to the present were estimated for the first time in Russian scientific literature.

Significant variations in the structure and volume of injuries worldwide were shown. This may be caused by the difference in the living quarter structure, cultural features, errors in data collection, accuracy of data sources, and improvement of the devices. However, in our opinion, two factors have the greatest influence: the design and specific technical solution of such devices and the presence of stairs accessible to the child in a residential building.

In addition, the possibility of children acquiring thermal trauma in a walker was described, including the ability to reach dangerous items, such as heaters, ashtrays, electrical connections, and hot drinks, including poisons.

The danger of walkers as a factor influencing the normal formation of bipedal locomotion and motor pattern was indicated.

The authors underline the need to inform the public regarding the dangers of walkers as much as possible or to introduce a complete ban on their use, which was done in Canada in 2004 that led to a decrease in the level of child injuries.

Keywords: baby walkers; baby walker-related injuries; exersaucer; baby injuries.

ПОВРЕЖДЕНИЯ, СВЯЗАННЫЕ С ИСПОЛЬЗОВАНИЕМ ДЕТСКИХ ХОДУНКОВ

© ***А.Н. Шаров[1], А.В. Кривова[1], С.С. Родионова[2], В.П. Захаров[1]***

[1] ФГБОУ ВО «Тверской государственный медицинский университет» Минздрава России, Тверь;
[2] ФГБУ «Национальный медицинский исследовательский центр травматологии и ортопедии имени Н.Н. Приорова» Минздрава России, Москва

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В статье представлен обзор 40 литературных источников о травмах, полученных в детских ходунках. Оценены данные, начиная с первых исследований по представленной тематике (1981) и по настоящее время. Подобный обзор источников проведен в России впервые.

Выявлены значительные вариации структуры и объема травм в мире. Вероятной причиной этого являются различия в строении жилых помещений, культурные особенности, погрешности сбора данных, точность источников данных и совершенствование самих устройств. Однако наибольшее влияние оказывает, по нашему мнению, два фактора: первый — дизайн и конкретное техническое решение подобных устройств, второй — наличие в жилом помещении лестниц, доступных для ребенка.

Дополнительно описана возможность получить ребенком, находящимся в ходунках, термическую травму; возможность достичь опасных предметов, таких как нагреватели, пепельницы, электрические соединения, горячие напитки и т. д., в том числе и яды.

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Указана опасность ходунков как фактора, влияющего на нормальное формирование двуногой локомоции и двигательного паттерна.
Определена необходимость как можно больше информировать широкую общественность об опасности ходунков либо ввести полный запрет на их использование, что было сделано в Канаде в 2004 году и привело к снижению уровня детского травматизма.

Ключевые слова: детские ходунки; детский травматизм; стационарные игровые центры.

Background

Children's injuries, owing to the physiological and ethical nature, have always held a special place in medical science. Exploring the causes and, most importantly, prevention of injuries is a major task. At that, following progress to help in the development and care of babies, various devices started to be widely used, such as educational mats, automatic rockers, jumpers, baby walkers, etc. But unfortunately, devices designed to help the child develop or provide leisure may be dangerous. This article presents an analytical review of the literature on infant injuries associated with the use of baby walker.

Materials and methods

Data were obtained from 10 global major medical scientific databases in April 2018: the National Center for Biotechnology Information, PubMed, Medline, Medscape, The Cochrane Library, British Medical Journal, Google Scholar, Web of Science, Scopus, and World Health Organization. Collectively, approximately 3000 links were checked, 138 articles were viewed, and 40 articles were selected for review.

Review

Modern baby walker is a technical device on a wheel base that holds the child in an upright position. Since the 19th century, the so-called epoch of the industrial revolution, the baby walker has been widely used and numerous patented improvements of similar devices appeared [1, 2].

According to various studies, the rate of baby walker use worldwide is quite high, ranging from 42% to 95% (Fig. 1), with an average of 62.11% ± 18.5% (99% CI, 43.61–80.61) [3–11].

In the scientific community, various damages are naturally considered as the main problem associated with baby walkers.

The first study on baby walker-related injury was conducted in 1981 by scientists from Italy, L.E. Fazen and P.I. Felizberto [12]. Parents of 49 children aged from 8 to 14 months were interviewed via a written questionnaire, followed by a telephone interview. The aim of these interviews was to determine the frequency of baby walker use and the frequency and severity of the child's injuries. The majority of the respondents (86%) placed their children in various types of baby walker at age 4 months to 1 year. Half of the 42 children placed in baby walkers had at least one accident, such as rollover, falling

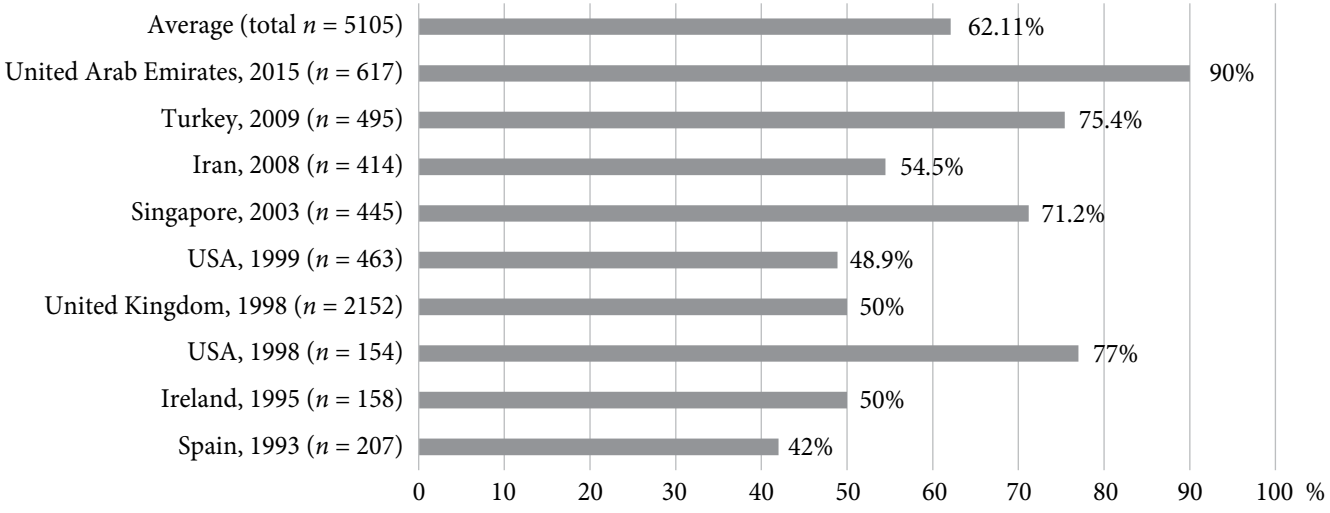

Fig. 1. The relative size of the walker groups according to various studies [3–11]

from stairs, or finger jamming. In 2 cases, medical care was required. Both infants had head and neck injuries after falling from stairs.

In the conclusion, the authors indicate that pediatricians and other health care providers should inform the parents of the risks. Besides, it is advisable for the regulatory authorities to improve the labeling of baby walker and the manufacturers to fine-tune the age and weight settings of their products.

The following study was conducted in the USA in 1982 [13]. The pediatric practice of authors C.A. Kavanagh and L. Banco was represented by a heterogeneous demographic population consisting of approximately 12,500 pediatric patients. Within 3 months, the parents of all children, who underwent preventive examination at the age from 5 to 15 months, were interviewed. In the group of 195 patients, 77% of the patients (n = 150) had used baby walkers, 31% of them (n = 47) received closed craniocerebral injury, fractures, lacerations, tooth extraction, and perforation of the soft palate. Besides, evidence in favor of the use of baby walkers was absent. As a result, they concluded that informing about the risk of injuries from baby walker use is the task of health care workers of the preventive level.

Dr. S. Wellman and J.A. Paulson from Cleveland (USA) continued the study of this topic in 1984 [14]. They conducted a retrospective analysis of the cases of seeking medical help in a large emergency hospital during a 23-month period. The baby walker-related injuries were isolated. Based on the data, 97% of the children had head injuries and falls from the stairs accounted for 68% of all injuries. In addition to the basic pediatric examination, patients in 22% of the cases had acquired additional consultations from surgeons or dentists.

In 1986, M.J. Rieder, C. Schwartz, and J. Newman from Toronto (Canada) conducted their research on baby walker-related injuries [15]. In the emergency pediatric department, baby walker-related injuries received within one year were analyzed. A total of 139 injuries were recorded, of which 29 were fractures. The most severe injury recorded was falling from stairs, a total of 123 cases. At that, one third of the falls occurred despite the presence of special limiters, the staircase gate. A prospective observation after 2 months revealed that one third of the parents continued to use baby walker, two thirds of the children had repeated injuries during this time and only less than half of the parents installed the staircase gate.

The authors concluded that baby walker can cause severe injuries in babies. Hence, warning labels and user guides should be presented to the parents.

The following analysis was conducted by P.M. Wishon and his team in 1987 [16]. The source of information was the National Electronic Injury Surveillance System of the United States (NEISS). The authors indicated that according to the NEISS data, more than 20,700 injuries required urgent medical care, more than 11,800 cases were sufficiently serious in which the patients seeked inpatient treatment for their injured children. The study revealed that 36% of the children fell when using the baby walker. Craniocerebral injuries was the most common baby walker-related injury, however, many injuries were subclinical and were not registered. The authors concluded that increased parental awareness about the child care safety can reduce the frequency of baby walker-related accidents. Information on the safe use of baby walker should also be included in standard injury prevention instructions in order to make it more accessible to staff and parents.

Another study was conducted in Minnesota (USA) in 1990 by M.D. Parrington, J.A. Swanson, and F.B. Meyer [17]. In the first level traumatological hospital, a retrospective analysis of 129 case histories was performed. It was established that in 19 patients (14.7%), baby walker caused the damage, and it was the third most traumatizing mechanism. The average age of pediatric patients was 8.7 months. In 18 cases (94.7%), there was a fall from the stairs. Nine (47.4%) children were diagnosed with a fracture of the cranial vault.

The authors revealed that baby walker represents a frequent cause of head injuries in this age group, hence further efforts should be directed at the prevention baby walker-related injuries.

Dr. T.J. Coats and M. Allen of the Emergency Department of the Leicester Royal Infirmary (United Kingdom) continued to study the baby walker-related injuries in 1991 [18]. They retrospectively analyzed 1049 children presented to their clinic. The results showed that 22 injuries were associated with baby walker, and 3 of them were injuries of the skull. The most common mechanism of injury was falling from stairs. A serious correlation has been

established that baby walker-related injuries occur at the same frequency as injuries in traffic accidents. The authors concluded that the baby walker poses a significant hazard to young children.

Another study was conducted in Virginia (USA) in 1993 [19]. C.T. Chiaviello, R.A. Christoph, G.R. Bond studied cases presented at the pediatric emergency department of within a period of 3 years and 8 months. Sixty-five patients (8.9%) were identified with baby walker-related injuries. Children aged 3 to 17 months were injured, while 95% of them were younger than 1 year old.

Mechanisms of injury included the following:
- Falling from stairs in 46 children (71%);
- Rollover in 14 children (21%);
- Falling from the porch in 2 children (3%);
- Burns in 3 children (5%).

The following areas were injured:
- Head and neck (97%);
- One or more limbs (6%);
- Other (3%).

Severe injuries occurred in 19 children (29%) (frequency was 1.7‰), they included:
- Fracture of the skull;
- Cerebral concussion;
- Intracranial hemorrhage;
- Burns of II–III degrees;
- Fractures of the cervical spine;
- Death.

All these injuries, except for burns, occurred as a result of falling from the stairs. The authors concluded that the frequency and severity of injuries associated with baby walker use are unacceptably high.

Practically at the same time (1994) the baby walk-related injuries were studied by J. Mayr et al. in the city of Graz (Austria) [20]. A survey of 240 families (138 boys and 102 girls) who visited an outpatient clinic was conducted to identify baby walker-related injuries. The children ranged from 2 to 6 years old. The survey was conducted within 3 months. Additionally, the study retrospectively included 172 cases that seeked medical help in the department of pediatric surgery from January 1990 to June 1993. Results showed that baby walker was used in 55% of the children, and 20% of them were injured. In this retrospective study, the authors observed:
- 19 skull fractures;
- 23 cerebral concussion;
- 125 bruises and lacerated wounds of the head;
- 4 tooth dislocations;
- 3 fractures or sprains in the upper limbs.

It has been established that baby walker is at the third place among the causes of injuries in children aged between 7–14 months.

The authors also concluded that, despite warnings, baby walker still represents a frequent cause of severe head injuries in infants. Therefore, they recommend a general ban on the sale and production of baby walkers.

E. Petridou et al. from Athens (Greece) continued to study the topic of baby walker-related injuries and considered the period from May 1994 to April 1995 [21]. During this time, 49 cases of baby walker-related injuries were detected using the child injury monitoring system in 2 emergency clinics. The frequency of injuries among all infants was 3.5‰, while that among the children who used baby walker was 16%. There were more boys and 9–10-month-old infants among those injured. A fall from a height, particularly from the stairs, was the primary damage mechanism. In the group of severe injuries, 3 bone fractures and one second-degree burn were noted. Six children required hospitalization and 7 children needed outpatient follow-up. The authors concluded that baby walkers bear a significant high risk of injuries, while they do not have a certain positive effect. Since most of the baby walker-related injuries occur on the stairs, it is necessary to make changes to the design of the baby walker to reduce the likelihood of falls. In addition, it is necessary to actively inform the parents about the risks and possible consequences of the use of baby walkers.

Another study was conducted in Columbus (USA) in 1993–1996. [22]. Over 3 years, G.A. Smith et al. analyzed cases of treatment for baby walker-related injuries in the pediatric emergency department. A total of 271 cases were considered, the average age of the patients was 9.2 months; 62% of the patients were boys. Ninety-six percent of the children were injured from falling down stairs. In addition, the number of steps was statistically significant and was associated with fractures of the skull bones, and then with subsequent hospitalization. Falling off more than 10 steps had a relative risk of fracture of the skull bones, OR = 3.28 (95% CI 1.35–7.98). The injuries included the following:
- 159 bruises/racomas (58.6%);
- 35 cerebral concussion/contusions of the soft tissues of the head (12.9%);

– 33 lacerated wounds (12.2%);
– 26 fractures of the skull bones (9.6%);
– 9 nosebleeds (3.3%);
– 4 fractures of other bones (1.5%);
– 4 tooth dislocations (1.5%);
– 1 burn (0.4%).

The injuries included 3 depressed skull fractures and 3 cases of intracranial hemorrhage. Ten patients (3.7%) were hospitalized, and all of them had fractures of the skull bones as a result of falling down stairs. At that, in 78% of cases the children were looked after, including in 69% of cases the childminder was an adult. The attitude to the baby walker was the following:

– 45% of families kept baby walker after the injury;
– 32% used baby walker again after the injury;
– 59% of parents admitted that they were aware of the potential dangers of baby walker;
– 56% of parents spoke in favor of banning the sale of baby walker at the national level;
– 20% of parents were against the ban of baby walker.

The authors concluded that, despite the current injury prevention strategies used, including supervision by adults, warning labels, educational child care programs and the staircase gates, the number of serious injuries associated with the baby walker did not decrease. The US Consumer Product Safety Commission shall promulgate regulations similar to that of Canadian voluntary standard. Production and sale of devices that do not meet these standards should be prohibited. Campaigns for recalling or replacing walkers should be conducted at the national level.

In 1996, Canadian scientists J.M. Walker et al. published their work [23]. A retrospective study was conducted in 3 Canadian provinces to determine the method the baby walkers were obtained, the amount of baby walker use and the frequency of baby walker-related injuries. A structured questionnaire enabled to reveal on the telephone the historical and current data. Seventy-three parents of 111 children agreed to be the respondents. Baby walkers were used for the infants between age 5 to 10 months. The results revealed 14.4% of injuries, most of them were soft tissue injuries. A typical cause of damage was a fall from stairs. Only 2 children received medical care, and they did not need further follow-up. Older models of baby walkers with 5 or fewer wheels were significantly associated with higher levels of injury ($p < 0.01$). Furthermore, baby walkers were received from relatives or friends in 49% of the cases or purchased on the secondary market in 51% of the cases. In conclusion, the authors noted that it is necessary to raise the public awareness about the dangers of using baby walkers, especially the old models.

The following data was obtained by Korean scientists J.S. Han and H.S. Shin in 1998 [24]. The primary objective of the study was to identify the nature of the baby walker-related injuries. The data were collected from May 13 to June 15, 1998. The survey involved 438 mothers who used baby walker for their children aged 1 to 33 months (mean age of 6 months). Lesions were detected in 19.2% of the children ($n = 84$). The injuries are represented by the following groups:

– Falling (52.4%);
– Rollover (21.4%);
– Collision with a wall (17.9%);
– Burns (1.2%).

There were mainly the head and neck injuries (88%). Most of the injuries were minor and occurred at home in the presence of the mother. The most common reason for using the baby walker was the desire to "employ the child" and "amuse it." Many parents used similar baby walker to develop walking skills in children. At the time of the study, there were no and there is still no evidence that the baby walker contributes to walking skill development.

The authors concluded that the baby walker-related injuries in children are relatively minor, but frequent. In addition, there is the possibility of fatal outcome. Therefore, a warning labeling policy, distribution of the safety guidelines, and quality control of baby walker are necessary to prevent baby walker-related injuries associated.

A similar study was also conducted by P.G. Thompson from New South Wales (Australia) in 2002 [25]. In 2000, a standard for marketable baby walker was adopted, which was created in accordance to the similar one in USA (ASTM F977 adopted in 1997). The American standard has 2 basic requirements:

– The baby walker must have a wider base than the standard doorway (i.e., more than 900 mm);
– The baby walker must have a certain level of stability and a gripping mechanism (brake)

capable to stop the walker at the edge of the stairs.

In this case, baby walker sold in the United States must satisfy only one of these 2 requirements, and the New South Wales Department of Fair Trading accepted only the second requirement. The author of the study has drawn the attention to the fact that the reliability and effectiveness of mechanism in each specific case are unknown.

Data on the baby walker-related injury was collected from 1986 to 2000 in emergency departments of hospitals in South Australia and Victoria. There are 4 categories of injuries:

- Stairs (injuries associated with falling on the stairs);
- Stability (injuries associated with falls on flat surfaces);
- Proximity or accessibility, that is, injuries associated with the ability to reach dangerous objects such as heaters, ashtrays, electrical connections, hot drinks, etc, with baby walker;
- Others.

It was established that only in 7.5% of the cases of injuries was in the "stairs" category, the child needed hospitalization in comparison with the 12.1% of injuries in the "stability" group and 27.3% in the "proximity" group. Therefore, in this study, the severity of injuries from falling down stairs is relatively less. The categories "stairs" and "stability" together constituted 50% (95% CI, 36.4–63.6%) of all hospitalizations, and the next 50% accounted mainly for the category "proximity," or more precisely 46%.

It is worth noting that the typical regulation of the standards will largely eliminate the potential injuries from the "stairs" and "stability" categories. However, the absence of criteria for the categories "proximity" and "others" may indicates that a quarter of all injuries, including about half of the hospital injuries, will occur at the same frequency. In conclusion, the author pointed out that a complete ban on the use of baby walker is still preferable to voluntary standards.

Also, the study requires close attention, which occupies a central place in the study of baby walker-related injury [26], which was conducted by scientists from Ohio B.J. Shields and G.A. Smith (USA). It presents the data mentioned above in a study of 1987 [16] of the NEISS. The analysis included 197,200 (sic!) cases of injuries associated with baby walker, in children under 15 months treated in emergency departments in the United States from 1990 to 2001.

The primary aim of this study was to determine the efficiency of passive prophylaxis of this type of injury, which included 2 stages. The first is the proposal in 1994 to create stationary gaming centers as an alternative to baby walkers, and the second is the introduction of a voluntary standard (see above) F977–ASTM (American Society for Testing and Materials) in 1997.

As a result of the analysis, the following results were obtained: the number of injuries remained relatively constant from 1990 to 1994, which was an average of 23,000 cases per year. Then there was a significant decrease in injuries, by 76% during the reference period, from 20,900 cases in 1990 decreased to 5,100 in 2001.

This study revealed that head injuries accounted for 91.3% of all the injuries. The remaining 8.7% of the injuries occurred in the areas as follows:

- Upper limbs (3.1%);
- Lower limbs (1.3%);
- Other areas (4.3%).

According to the diagnoses, the injuries were as follows:

- Superficial injuries of soft tissues (53.0%);
- Closed craniocerebral injuries (25.1%);
- Lacerated or contused wounds (10.1%);
- Damage to bones and joints — fractures/dislocations (5.2%);
- Burns (2.2%);
- Others (4.4%).

The approximately 178,200 (91.3%) head injuries included 54.7% of soft tissue injuries; 27.7% of closed craniocerebral injuries; 17.6% of other types of injuries.

Fractures of the cranial bones amounted to 6043, representing 62.3% of all the fracture cases. Other fractures were distributed among the body parts as follows:

- Torso (15.9%);
- Upper limbs (10.8%);
- Lower limbs (5.6%);
- Facial skull (5.4%).

Falling from stairs is the prevailing mechanism of injury (73.7% of cases). Also, falls from stairs are statistically associated with the risk of fractures of the skull bones ($p < 0.01$; OR 3.74; 95% CI, 3.42–4.09). Additionally, the authors reported that

5% of all the children who sought medical help needed hospitalization.

The authors of this study concluded that an introduction of passive injury prevention strategies, such as stationary gaming centers as an alternative and the reconstruction of baby walker to prevent falls from stairs, is statistically significantly associated with a decrease in the number of infant injuries.

Dr. Christopher E. Gaw, Thiphalak Chounthirath, and Gary A. Smith from Columbus (USA) turned to the data from the NIESS system in their study (2017) [27]. Their work included the data from 1991 to 2011. The authors noted a general decrease in the pediatric injuries from 1991 to 2003, and then it increased from 2003 to 2011. The decrease was contributed by a significant decrease in the number of injuries associated with baby walker (jumpers), exercise equipment; and the increase was due to a significant increase in contusions and closed head injuries.

As noted in the previous study [26], the reduction and stabilization of the level of baby walker-related injuries is associated with the prevention strategies adopted by the medical community and walker manufacturers since 2003.

In 2001, an appeal was issued by members of the American Academy of Pediatrics, which invoked banning the use of baby walker or using stationary play centers as an alternative to baby walker [28]. This report is constituted of the data of help-seeking parents of 8,800 children under the age of 15 months in the US emergency departments in 1999. The children had baby walker-related injuries (including 34 (sic!), in which fatal outcomes were recorded from 1973 to 1998).

In this review, the results of multifactorial studies with an assessment of baby walker-related injuries among other things are of interest.

In 2006, the scientists from Baghdad (Iraq) [29] cited the following data: injuries resulting from the use of baby walker occurred in 78 children out of 100 (94%). The immediate causes were the following:

– Pushing by someone (37%);
– Mechanical defect of the device (36%);
– Rollover (22%).

Most of the injuries occurred in the hallway (52%). Head injuries occurred most frequently (82%) and included soft tissue hematomas, nasal bleeding, injured lips, damaged teeth, wounded tongue, bruises and fractures of the skull bones. Limb injuries were recorded in 17% of the cases and included injuries and/or bruises, ecchymosis and dislocations of joints.

Also, a similar study was conducted by a group of authors from the city of Dénia (Spain), from 1992 to 1993 [30]. Among the children who used the baby walker (n = 207), 24.9% were injured, namely, a fall in 76.2% of the cases; outpatient injuries in 14.3% of the cases; hospital injuries in 4.8% of the cases. Injuries were much more common in boys.

Results of other multifactor studies are as follows: (1) in Dublin (Ireland), year 1995 [31], 12.5% of the children (n = 158) had at least one injury (2) in Singapore, year 2003 [32], 7% of all respondents had baby walker-related injuries (n = 311), the main types included falling on a flat surface (5.5%) and falling from stairs (1.9%); (3) in Iran, from 2007 to 2008 [33], 14% of injuries in 414 children but none of them were hospitalized; (4) in Riyadh (Saudi Arabia), year 2016 [34], 19.5% of baby walker-related injuries were identified in a total of 579 respondents. According to a study in Al-Ain (UAE) that was published in 2016, 18 hospitalizations collectively shown 50 cases of baby walker-related injuries that necessitated emergency care, 5 cases of disability, and 1 death per 1000 infants (sample size was 2376 children in 659 families) [35].

Other baby walker-related injuries are burns.

J. Colvill [36] was the first one who paid attention to baby walker-related burn injuries in 1966, reporting on 3 cases of infant burns at the Royal Victoria Hospital in Belfast (United Kingdom).

In 1975, doctors from The Royal Belfast Hospital for Sick (Belfast) conducted a review of baby walker-related burn injuries [37]. A total of 31 cases were identified, an average of 2 or 3 cases were annually reported from 1963 to 1975. But in 1972, 9 injured children were registered.

Then the doctors from the burns department of the Leicester Royal Infirmary in the UK dealt with this problem [38]. After studying the statistics (1988), they concluded that the increase in the use of baby walker was accompanied by an increase in the number of burns. At that, the severity of these burns was more significant. The head, neck, and upper limbs were injured more frequently.

In 1990, colleagues from Columbus conducted a study of thermal damage related to the use of the walker [39] in the Department of Pediatrics at Ohio University (USA). During the reference year,

4 patients out of 61 (6.5%) belonged to this group. Baby walker-related burns had a larger affected area (11.6%) as compared with other causes.

In 1994, a team of scientists from the Burn Department of the Morristown Hospital [40] in the town of Snowsey (Great Britain) checked the efficiency of additional warnings about the dangers of baby walker, made by the Department of Commerce and Industry in 1984 and the British Institute of Standards in 1989. The doctors determined whether the degree or frequency of thermal damage has reduced after giving these recommendations. It was found out children under the age of 15 months were admitted to the Burn Department in 1994, whether the child was in a baby walker at the time of the injury. Eight such cases were revealed out of the 32 hospitalized infants aged 6 to 12 months. According to the authors, the frequency and severity of the baby walker-related thermal injury remains high, despite the tightened security measures, and probably the time has come to agree with the American Academy of Pediatrics to ban such baby walker.

Discussion and conclusions

Taken together, these results clearly demonstrate that the prevalence of baby walker-related damage varies considerably (Table 1).

In our opinion, the reasons for this considerable difference are the difference in residential accommodation, cultural characteristics, errors in data collection, accuracy of data sources and improvement on the baby walker. However, there are 2 factors that exert the greatest impact.

The first factor is the design and specific technical solution of the baby walker. Indeed, improvements on engineering design, including standardization supported (increase in the size of walker and the number of wheels, use of blockers and automatic brakes), could reduce the number of injuries significantly [23, 25, 26].

The second factor is the presence of stairs in the residential accommodation that is accessible by the children. Falling from a height is undoubtedly more traumatic (Table 2).

It is repeatedly stated that falling on the stairs leads to more severe consequences [19, 21, 22, 26] and it is significantly associated with the risk of cranial fractures (OR 3.28; 95% CI, 1.35–7.98 [22] and OR 3.74 ($p < 0.01$); 95% CI, 3.42–4.09) [26]. It should be noted that the baby walker-related injuries unrelatable to this mechanism are, for the most part, outpatient cases or those do not require the medical attention [15, 17–19, 21–23, 26]. Obviously, in connection with the design of baby walker (fixed lower half of the body), the head and upper limbs are affected more often when injuries [12–14, 19, 20, 24, 26].

Table 1

Prevalence of baby walker-related injuries in various studies [12, 13, 16, 19, 21, 23, 24, 31–34]

Place and year of the study	Incidence of injuries	Sampling size (*n*)
Italy 1981 (poll)	50%	42
USA, 1982 (poll)	31%	150
USA, 1987 (NIESS)	35%	57500
Virginia, 1993 (monitoring)	8.9‰	Not specified
Athens, 1995 (monitoring)	16 ‰	Not specified
Dublin 1995 (poll)	12.50%	158
Canada 1996 (poll)	14%	111
Korea 1998 (poll)	19%	438
Singapore, 2003 (poll)	7%	311
Iran, 2008 (poll)	14%	414
Saudi Arabia, 2016 (poll)	19.5%	579

Table 2

The proportion of falls on the stairs among other mechanisms of walker-related injury according to various studies [15, 17–19, 21–23, 26]

Location and year of the study	Percentage of falls on stairs	Sample size
Toronto, 1986	88.40%	139
Minnesota, 1990	94.00%	18
Leicester, 1991	Most frequent mechanism	1049
Virginia, 1993	71%	65
Athens, 1995	Primary mechanism	49
Columbus, 1996	96%	271
Canada, 1996	Most frequent mechanism	111
USA, 1991–2001	73.70%	197,200

Conclusively, we declare that the baby walker poses a serious danger to the child (injuries, up to death [27, 35]; burns [36–40]); and enables the child to reach dangerous objects such as heaters, ashtrays, electrical connections, hot drinks etc., including poisons [41]).

It should be noted that the baby walker has a negative effect on the normal formation of two-legged locomotion [42–45] and motor pattern [46].

It is natural that all authors of different studies invoke in different ways to inform the wide audience about the dangers of baby walker as much as possible or to impose absolute prohibition on baby walker use, which was done in Canada in 2004 and led to a decrease in the level of pediatric injuries [47].

In addition, stationary gaming centers are offered as a significantly less dangerous alternative. We certainly support this recommendation.

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Contribution of the authors

A.N. Sharov, A.V. Krivova, V.P. Zakharov performed the search and translation of the articles, as well as data analysis and writing the text.

S.S. Rodionova was involved in search and translation of articles, and the article design.

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Information about the authors

Alexander N. Sharov — MD, PhD Student of the Department of Traumatology and Orthopedics, Tver State Medical University, Tver, Russia. E-mail: sklif79@gmail.com.

Александр Николаевич Шаров — аспирант, кафедра травматологии и ортопедии, «Тверской государственный медицинский университет» Министерства здравоохранения Российской Федерации, Тверь. E-mail: sklif79@yandex.ru.

Alla V. Krivova — MD, PhD, Associate Professor of the Department of Traumatology and Orthopedics, Tver State Medical University, Tver, Russia.

Svetlana S. Rodionova — MD, PhD, Professor, Director of Since-Clinical Center Osteoporosis SMIC TO N.N. Priorov (CITO), Moscow, Russia.

Valeryi P. Zakharov — MD, PhD, Associate Professor of the Department of Traumatology and Orthopedics, Tver State Medical University, Tver, Russia.

Алла Владимировна Кривова — д-р мед. наук, доцент кафедры травматологии и ортопедии, «Тверской государственный медицинский университет» Министерства здравоохранения Российской Федерации, Тверь.

Светлана Семеновна Родионова — д-р мед. наук, профессор, руководитель научно-клинического центра остеопороза НМИЦ ТО им Н.Н. Приорова (ЦИТО), Москва.

Валерий Петрович Захаров — канд. мед. наук, доцент кафедры травматологии и ортопедии, «Тверской государственный медицинский университет» Министерства здравоохранения Российской Федерации, Тверь.