Playground Safety: An Approach to Environmental Planning

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Received: March, 2010          Accepted: Sep, 2010

Introduction
Social health and community safety problems are increasing with population density rising. These sorts of problems are not limited to a specific social group; it means that people of all ages are affected by safety problems. However, children are of a critical condition among the other social groups. According to the United Nations and World Health Organization, cities approaches have important role in human health. Surely, kids’ safety is known as one of the prominent elements among these approaches. Undoubtedly, making a healthy city needs some valid and reliable planning in terms of community safety. Also vulnerable social groups such as children need specific considerations. The places related to kids such as parks and playgrounds should be assessed from the view point of safety considerations. Each year 10 to 30 million children and adolescents suffer from some kinds of disorders and injuries. The major part of these events includes unintentional injuries which cause 830000 deaths for children under the age of 18. Unintentional injuries are known as the main cause of death for children aged more than 9 years. According to WHO (2005) 95% of injured children live in low-moderate income countries, and every death case for children leads to many discomforts, disabilities and other related injuries.

Materials & Methods
This study was done in two methods, descriptive and review study. In the first phase, related scientific reports about urban planning for children, playground designing, public spaces and kids were used. In the second phase, some articles describing related causes and effects were studied. PubMed data base was used for the review study. For data collection and paper selection, the following key words were used: playground, kid and injury. Finally, 10 articles were studied among the articles gathered in the first step. Also, some limitations were used for better data collection: “age, language, human”.

Results
A) In a case-control study which has been conducted by Fiissel, et al. the data base of the Hospital for Sick Children (Toronto) was assessed. Children who fell from a height off the playground equipments were the mentioned cases. Control group included children who fell from a standing height in a playground. Fractures were major if they required reduction and minor if they did not. This study showed that fractures caused by falling off the equipments were 3.91 times more than other kind of fractures. According to the collected data, fallings off the playground equipments made major fractures in compare with fallings off both the equipments and standing heights.

B) Khambalia, et al. in their study about risk factors in unintentional injuries’ related to falls in young children (6 years old and less) in some databases showed that among 3819 papers identified, only 14 studies met the inclusion criteria, one of which was in Norway, one in Korea, 2 in Canada, and 10 in the USA.
The search was international, with no language restrictions, and in both published and unpublished researches. There was no formal definition for falls. This means that the studies were included if the fall was defined according to the International classification of diseases codes, observation, or by clinician, parents or proxy reporting. A search filter and electronic search strategy were developed in collaboration with a librarian experienced in systematic reviews, as well. Also, the search filter used a series of fall-injury related keywords to identify potentially relevant articles in some databases.

C) Laforest, et al. have done a study evaluating whether surface characteristics and the height of playing equipments are related to the occurrence and severity of injuries from falls. In this study between the summers of 1991 and 1995, conformity of playing equipments to Canadian standards was assessed in a random sample (n=102) of Montreal public playgrounds. All injuries occurred at the emergency department of the Two Children’s Hospital of Montreal were recorded and parents were interviewed. Inspected equipments were implicated in 185 injuries. This study showed that 35% of cases occurred on a surface are of higher risks than other cases. Injuries were 2.56 times more likely to occur on equipments higher than 2 m compared with equipments lower than 1.5 m. Analysis of risk factors by severity of injury failed to show any positive relationships between the g-max or height and severity, whereas surface material was found to be a good predictor of severity. This study confirms the relationships between the risk of injury, the surface resilience, and the height of equipments, as well as between the type of material and severity of injury. The approach of this study was “playground equipments”.

D) Sherker, et al. have done a case control study on playgrounds safety. This study was done on children from Victoria in Australia who fell from school playground equipments and landed on their arms. In this study 78 primary and preschools children were randomly selected from a catchment area of five hospitals. According to the results the risks of limb fractures were based on the equipment heights more than 1.5 m. Also, children who fell off heights more than 1.0 m were 3.0 times more likely to sustain an arm fracture compared with children who fell off heights less than or equal to 1.0 m. This study showed that surface substrate was the most significant surface related risk factor for arm fracture. Also according to the obtained results, the thickness of the surface under the playground is important, but it needs to be completed by another protection method such as the modification of playgrounds height.

E) Tan, et al. have done a descriptive cross-sectional study on three emergency centers in Singapore during 2000-2004. This study included 19094 injury cases among children up to 16 years old. 1617 assessed cases were occurred in playgrounds in which about 70% of injuries were related to falls. About 37% of the cases have occurred between 6 to 9 pm, and 28% between 3 to 6 pm. There were significant differences between accident rates in the week days, too. This study showed that most of the fractures occurred in 6-10 years old children. This study emphasised on the three approaches of “playground equipments, environment, and kids”.

Discussion and Conclusion
According to what has been stated, most of reviewed papers have emphasized on “playgrounds equipments”. However in two articles, other items such as lighting and surface characteristics were underlined. Four of the assessed articles have been focused on the approach of child characteristics. The rate of playgrounds’ accidents in low income countries is more than in high income countries, while most of the researches and journal papers are from high income countries. Also population and population density as the risk factors of accident incidence are high in developing countries. So the necessity of playgrounds safety assessment in high risk communities is clear. Surely some kinds of playground related injuries in low income countries will be controlled by implementation of practical guidelines of research which have been done in developed Countries.
Under this condition some changes in recommended plans might be required according to economics and cultural characteristics of communities.

According to the assessed articles, the majority of the relevant experts and organizations confirm the importance of playgrounds injuries prevention, but unfortunately playgrounds safety problems and new cases of injured children in playgrounds still exist.

Due to this review and descriptive study three guideline themes are recommended for playground planning as follows:

**Equipment:** Equipments includes all of the playing tools and equipments. Safety audit and risk assessment should be done for playgrounds equipments. However as three of playgrounds equipments (swings, climbers and slides) are known as high risk equipments, their safety supervision requires in-depth safety audit.

**Environment:** In this regard “environmental characteristics” are divided into two parts including environmental hazardous agents, and environmental feature. Environmental agents include factors like noise, lighting, and air pollution. Physical environmental feature include characteristics such as sign graphics and aesthetics concepts. Therefore playgrounds environment should be conducted in the view point of safety investigation.

**Children:** Characteristics of kids in both somatic and behavioral factors should be surveyed. Generally, play related behaviors among children might be risky, and children love excitement and adventurism. Therefore these characteristics should be considered for preparing safer and healthier playgrounds. Also, as there is no correlation between children’s motor abilities and risks, assessing children’s behavior requires in-depth observations and planned evaluations for both somatic and moral performances. Study of body types and anthropometric measurements might be needed for equipments adaptation to children’s physical characteristics, as well.

Also according to above mentioned approaches and considering safety audit planning, the following recommendations are useful for having safer playgrounds:

- Playgrounds safety audit according to effective plans
- Documentation of accidents and following near-misses
- Cooperation with related NGOs
- Making an integration between environmental planning and safety considerations
- studying Kids’ playing behaviors
- Environmental hazards assessment

Finally, children’s safety has a prominent role in boosting healthy cities. So environmental planning based on safety regulations should be considered in urban management decision makings. Also making integration between sustainability concepts and community safety will make better conditions for public areas.

**Key words**
Playground, Environmental Planning, Safety, Children, Audit, Urban Planning