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HAZARDS IN KIDS FURNITURE

ABSTRACT

Home environment has many risks that threaten the health and lives of the infants and children. In this study, we will discuss negative effects of kids furnitures on children. These can be chemicals used in making furniture and ergonomic factors. Primarily issues that need to be considered in children furniture; comfort and appearance of the furniture and being safe and healthy. No matter what type of furniture, especially in children's furniture, health and safety should be at the forefront. The measure used in children's furniture, appropriate and sizes should be adjustable. The applications in the pediatric emergency departments, the trauma caused by fall takes place on the top. Stairs, windows and furniture pose a risk to infants and children. In this study in kids furniture; in the design and manufacture of furniture for manufacturers, as for the customers in buying, security, safety harmful chemicals used in production and ergonomic concepts were examined. Consequently, some assessments have been analyzed and matters to be considered are described.

Keywords: Furniture, Health, Children's Furniture, Kids, Hazards

1. INTRODUCTION

One of the most important periods of human life is the childhood. Home environment contains many risks threatening babies and children's health and their lives. Kids have a high risk of accidents in the home. Due to the fact that they are not aware of the dangers, and be open and sensitive to environmental risks, as they are curious in finding and learning issues [1]. Furniture plays an important and effective role in kids daily life that directly interact, in the process of mental and physical development that continued. Furniture can be rendered harmless by taking safety and health precautions for individuals and especially kids'. Primarily issues that need to be considered in children's furniture; are safe and healthy as well as comfort and appearance of the furniture. No matter what type of furniture, especially in kids' furniture health and safety should be at the forefront. Kids' furniture should be easy to use by children and be adjustable as desired. The applications in the pediatric emergency departments, the trauma caused by fall takes place on the top. Stairs, windows and furniture, pose a risk to infants and children [2]. In order to meet the basic needs of children, there is a need to do a children's room. This room should be arranged by

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considering the kids' needs. As well as, should be organized on the basis of the child's size. While meeting the needs of kids, various movement areas are organized in kids' rooms. While designing these places, kids' comfort and safety should be considered. Kids' room should be arranged in the manner of the needs of the kids. Comfortable and healthy furnitures must be designed. In addition, while these designs are performing, anthropometric and ergonomic dimensions of the kids should be considered. So the design will achieve its targets. If a person considered as a system with furniture that people use. For this system to work effectively and efficiently, a harmony must be between man and the furniture. Anthropometric measurements about the human body give the necessary information in order to develop this system. Anthropometric data are used to determine the field of human movement and work area with the form of furniture. For example, in terms of the user's physiological and psychological user's working should be provided more comfortable. For this requires knowledge of the user's dimensional measurement [3].

Ergonomics is an important role for children to grow up in the best atmosphere. Only very few designers use together local and international standards and nearly 50% designers were interested in anthropometric measurements. Finish and varnish were generally used in kids' furnitures. Just 70% of interior designers and 50% of manufacturer knows the term ergonomics [4]. Another important issue is ergonomics in the selection of furniture for children. Furnitures are life-enhancing products. However, when viewed in terms of ergonomics and beauty such as the home of every age group live, if necessary precautions are not taken, these can lead to injury or more serious problems especially for infants and children. Supplies and accessories at the design stage, forms and dimensions of the products must suitable to safety standards thus the risk is eliminated. If equipment or furniture not designed according to human, the human body damage is inevitable. The measure used in children's furniture should be adjusted as required.

2. RESEARCH SIGNIFICANCE

At present, today, children's furniture selection is an important factor, but parents and producers do not give enough attention to this issue. There are many missed points in this regard. There are many factors that threaten children's health both chemically and physically in furnitures. Furniture must be solidly built and should be in sufficient number. Too little or lots of extras furniture restricts the development of the child, so it is inconvenient. Families and producers should decide on these factors. Awareness has been tried to be created with this issue.

3. DESIGN FURNITURE FOR KIDS

One of the most important issue is ergonomics in the selection of kids' furniture. Ergonomics; by examining the physical and psychological characteristics of people, investigate harmony with people the environment and machine. Furnishings are products that make our lives easier. But there are a number of risks for infants and children if necessary measures are not taken. However, some risks can be prevented if furnitures are manufactured in accordance with safety standards. According to Huang and Dai's study in China; Children's furniture pay attention to the adaptation of children psychological changes and because the home environment is the first place they started to grow up, has a great influence in the development of children's personalities. It is stated that the children's furniture

products in the market are the same except for minor differences [5]. Forest products industry is closely related to ergonomics about furniture design. So it must conform to ergonomic principles. If equipment or furniture is not designed according to human, it is inevitable that damage to the human body [6].

In today's mass-produced furniture design, cubic design is dominated with the effects of production methods and techniques. In this case because of the poor design may consist kids' health and accident risk. Having some features furnitures such as large sliding doors, lots of drawers wheel, with metal and glass can be an example. It must be considered that in products equipped with electrical components, instead of 220 volt 12 volts need to be adapted to the product. However, in furniture design, operating mechanisms and necessary accessories are being developed by furniture industry in order to answer all the needs of person. Also security issues have been analyzed in this case. During the design of furniture, work systems are improved against all accidents. Damper cover mechanism, sliding door retarding systems and finger guard curtain systems have been used in door and covers are the appropriate systems for kids' furnitures (Figure 1 and Figure 2).



Figure 1. Damper cover mechanism and finger guard curtain systems have been used in door and covers [7]



Figure 2. Sliding door retarding systems [7]

Furthermore, cabinet systems must be placed in balanced, if necessary connected to the wall. Another topic to be considered is the bed base systems and they must be well designed ergonomically. The bases without adequate security element and ergonomically incomplete bases carry a greater risk for kids' and even adults. Unfortunately, Turkey is facing the news of the kids who died trapped between bases and beds from time to time. All items will be taken to the room of the kids', should be rounded. Drawer rails damper system must be secured systems. On the other hand; baby cot is the most important



furniture in the rooms. So many ergonomic features need to be considered on baby cot, lines should be rounded not sharp. Located on the edge of the bed I railings are must be J and should be at least 60 cm in height. Otherwise, as babies grow, they may fall jumping out of bed. Bar spacing in the bed railing, should not be too narrow than 2.5 cm. Otherwise, legs and arms may get stuck in it. Railings should be safe that babies cannot open. It should be taken the bed has exactly fit sizes for the bed cot. Trundle bed can be cleared more easily. However, the wheels should be checked whether safe or not. It is very important for the kids' in terms of health and growth and to sleep comfortably. So, cradle mechanism should be set accurately for quiet operation and in order to swing properly. Cradle is furniture that is in contact with kids' body so square cross section forms should not be used.

4. CHEMICAL HAZARDS IN KIDS FURNITURE

Each of furniture design is charming for both children and parents. However, these attractive designs that can threaten your health. Because the dyes and varnishes used in furnitures may contain carcinogenic materials. These harmful substances may lead to serious disorders when they may pass to the body by inhalation or by contact. Especially, non-toxic paint should be considered in the choice of wooden furniture. Uncertified paint and varnish products used in furnitures include major risks for health. The dyes used in kids room's furnitures must be have certified that European Standard EN 71.3, this standard brings limitations to heavy metals such as mercury, selenium, chromium, arsenic, antimony, barium, cadmium. Furniture with odorless paints and varnishes should be preferred. So you can provide to grow your kids in a healthier environment. For this most basic feature should be considered that paint and varnishes must be water based and have got too certified to European Standard EN 71.3. Consumers should ask whether it contains incompatible chemicals on health or not. Also customers are required to pay attention these certificates; GS (Geprüfte Sicherheit), TSE (Turkish Standards Institution) and E1. Formaldehyde ratios of chemicals on furnitures and paints contain heavy metals in furniture leads to mental retardation, cognitive and behavioral disorders in infants. Particle boards classified as E0, E1, E2, and E3 according to the amount of formaldehyde [8]. As a chemical; flame retardant used in upholstered furnitures and children's car seats. It is important that awareness about buying more natural furniture products such as wool, down, cotton, or polyester without fire retardants [9].

5. FINDINGS AND DISCUSSIONS

Amino plastic adhesive produced by decomposition of the formaldehyde emission of chipboard amounts are as follows. Dissociated from particle boards produced by aminoplastic adhesives, the amount of formaldehyde emission as follows (Perforator method);

- E0 (1-2 mg CH₂O/100 g fully dry particleboard)
- E1 (2-10 mg CH₂O/100 g fully dry particleboard)
- E2 (10-30 mg CH₂O/100 g fully dry particleboard)
- E3 (30-60 mg CH₂O/100 mg fully dry particleboard)

If particleboard surfaces paper coated with melamine, formaldehyde emission is reduced. According to scientific studies, formaldehyde emission decreases with increasing storage time [10]. In Table 1, as follows that inhalation of formaldehyde has side effects to health depending on the intensity of formaldehyde.



Table 1. Formaldehyde inhalation's side effects of increased density according to Pabst [11]

Density (ppm)	Side Effects on Health
0.05-1.0	Odor Threshold
0.05-2.0	Eye Irritation, Neurophysiological Effects
0.10-2.5	Nose and Throat Irritation
5.0-20.0	Severe Tearing in A Few Minutes, Shortness of Breath, Cough And Nose, Eyes, Throat Burning
20.0	Pulmonary Edema, Pneumonia

Furniture of places must be sufficiently ventilated. Temperature and humidity levels should be kept at an appropriate level [12]. Raw materials containing highly carcinogens should be prevented in furniture production. The use of raw materials containing high amounts of carcinogenic substances should be banned in kids' furnitures production. People's living standards have improved with China's fast-growing economy and today many families in China are aware of the importance of eco-friendly products for their children's growth. A survey was conducted due to the lack of analysis of consumers' environmental awareness of children's furniture. This survey was conducted in two major cities, Shanghai and Shenzhen in 2012-2013. As a result, 83% of 299 respondents preferred solid wood for children's furniture. According to the consumer, eco-friendly furniture has features such as natural, non-poisonous, scentless material and environmental certifications [13].

The study; investigated the anthropometric properties of 140 elementary school students and evaluated the dimensions of school furnitures. The effects of school furniture on the students' musculoskeletal system have been investigated. It has been determined that no suitable furnitures are used for the students' bodies in the school. It was observed that the students were sitting without back support during the course. It also appeared that the rows and chairs were in high dimensions. As a precaution to reduce the pain that can occur during childhood; row and chairs should be designed specially to be personal.

It has been suggested that ergotherapists and physiotherapists should play a more active role in schools, which is thought to be an important factor in avoiding important diseases [14] According to a study among 42 pediatric patients who were referred to İstanbul University, İstanbul Medical Faculty, Trauma and Emergency Surgery Unit; children injured due to falling down television on them in Turkey, risk factors, injury types were examined. It is determined that injuries are more common in boys than the girls. Five children lost their lives due to falling down television on them. The most common cause of injuries is inadequate fasteners [15]. The child can climb to the television unit and knock over them. The measure that can be taken for this situation is shown in figure 3.



Figure 3. Television security mechanism [16]

According to a study consist of 74 students (6th, 7th and 8th grade students) in a school in Michigan, popliteal heights of the students were measured. As a result, it was observed that 65% of the students did not find a chair suitable for chair depth and height [17].

6. CONCLUSION AND RECOMMENDATIONS

Most important of all, kids and babies should be in a healthy environment. In their daily lives they interact with furnitures in most such as home, nursery, and school indoor environments. Therefore, the correct choice of furniture is very important for the healthy and safely development of kids.

- In the selection of the kids' furnitures, mother-father-kids interaction has come to the fore. However, the kids' age can speculate (3+ years) to participate in decision-making processes. Naturally purchasing decisions for new-born children is effective parents. When buying furniture for a kids room quality-price balance, durability, suitability to the children's delight, functionality and operational safety are to the fore [18].
- Certain standards should be introduced on issues such as the raw materials used, ergonomics and safety in the manufacture of kids' furniture. The widespread use of these standards and supervision should be provided.
- Furniture that does not have sharp edges and corners should be preferred.
- Furniture should have durable and reliable construction [19].
- Metal parts should be painted with paint against oxidation.
- Materials which can be disposed of safely and furniture made from natural materials should be preferred.
- Baby must be connected with five-point seat belt (from the shoulders to the hips and passing between the legs) to the seat belt.
- If baby feeding chair has wheels, their wheels can be locked.
- Furnitures that can be knocked over with the slightest touch should not be used in kids' places because of small children too much moving.



- Small parts which can easily removable, should not be used in kids' furnitures.
- Baby cots should be single storey. If not protective fences should be in the upper bunk.
- Furniture should not be treated with chemicals harmful to health.
- Toy cabinet heights should be at the height of the reach of kids.
- Capless toy cabinet should be preferred in order to get the toys comfortable.

According to the study conducted with 394 students aged 7-12 in Ankara and the parents of these students; it was observed that families carried financial concerns in the selection of children's furniture. When parents choose furniture, they prefer wood and metal based materials. Plastic-based furnitures are almost never preferred [20]. One of the most important factors in a kids' room setting is the function. The regulation of movement areas and items to be placed properly according to the necessities very important to use the space. So when arranging furnishings should be provided a comfortable using space for the user. When children want to play with the toys, kids can be reach the toys easily and should be able to gather them comfortably. When editing this field, furniture and furnishings need to arrange a suitable design. Furnitures should be placed in the manner supporting the development of kids and teachers should be able to easily check and should be able to carry easily if necessary. Additionally, kids' furnitures should be well protected repairs must be made without delay.

NOTICE

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REFERENCES

- [1] Parlak, A., Babacan, O., and Sarı, E., (2011). Ev Kazaları ve Yaralanma-lar, *Journal of Clinical and Analytical Medicine*, pp:93-96.
- [2] URL-1, <http://www.cocuk-gelisimi.com/haber/778-cocuk-kazalari-cocuklari-evde-bekleyen-tehlikeler.html>. Erişim Tarihi:20.03.2014.
- [3] URL-2, <http://te.zavantag.com/docs/835/index-70830.html>. Erişim Tarihi: 24.02.2014.
- [4] Farooq, S., (2016). Kids' Furniture Market according to Ergonomical and Environmental Design, *Journal of Independent Studies & Research: Management & Social Sciences & Economics*, Volume:14, Number:1, pp:79-88.
- [5] Huang, X. and Dai, L., (2015). Chinese Cultural Values in User Experience Design of Kids' Home Products, *International Conference on Cross-Cultural Design, Practice and Impact*, pp:49-57.
- [6] URL-3, <http://www.bilgisayarkurdu.com/forum/konu/mobilyada-ergonomi-isbilim.242604/>. Erişim Tarihi:22.02.2014.
- [7] URL-4, <http://www.samet.com.tr>. Erişim Tarihi:27.01.2014.
- [8] Sofuoğlu, S.D. and Kuşçuoğlu, M.Ö., (2009). Çocuk ve Mobilya, *Journal of Bartın Faculty of Forestry, I. National West Black Sea Forestry Congress, Proceedings Book, Special Issue*, Volume:1, pp:101-107.



- [9] URL-5, <http://greensciencepolicy.org/wp-content/uploads/2013/12/Safe-Kids-Campaign-Report.pdf>. 02.03.2018.
- [10] Nemli, G. and Kalaycıoğlu, H., (1999). Melamin Emdirilmiş Kağıtlarla Kaplamanın Yongalevha Teknik Özelliklerine Etkileri, *Journal of Agri-culture and Forestry*, Volume:23, Number:1, pp:25-31.
- [11] Şendemir, E., (1991). Formaldehit Kullanımı ve Zararları, *Uludağ Medical Journal*. Volume: 2, Number:18.
- [12] Aksakal, F.N., Vaizoğlu Acar, S. ve Güler, Ç., (2005). Mobilyalardaki Kimyasallar ve Sağlık Etkileri, *Sürekli Tıp Eğitim Dergisi (STED)*, Volume:14, Number:12, pp:272.
- [13] Wan, M. and Toppinen, J.C., (2015). Consumers' Environmental Perceptions of Children's Furniture in China, *Forest Products Journal*, Volume:65, Number:7-8, pp:395-405.
- [14] Açık, E., Kayıhan, H., and Aran, O.T., (2014). Investigation of Anthropometric Suitability of School Furniture in Primary Schools—A Pilot Study, *Journal of Occupational Therapy and Rehabilitation*, Volume:2, Number:3, pp:131-140.
- [15] Güloğlu, R., Sarıcı, İ.Ş., Bademler, S., Emirikçi, S., İşsever, H., Yanar, H., and Ertekin, C., (2012). Falling Television Related Child Injuries in Turkey: 10-year Experience, *Turkish Journal of Trauma and Emergency Surgery*, Volume:18, Number:1, pp:61-64.
- [16] URL-6, <http://www.babysafehomes.com/safety-study-finds-tv-set-tip-over-injuring-more-kids/>. Erişim Tarihi:25.03.2018.
- [17] Parcels, C., Stommel, M., and Hubbard, R.P., (1999). Mismatch of Classroom Furniture and Student Body Dimensions: Empirical Findings and Health Implications, *J Adolesc Health*, Volume:24, Number:4, pp:265-273.
- [18] Burdurlu, E., Kılıç, Y., İlçe, A.C., Elibol, G.C., and Yener, G., (2004). Okul Öncesi Çocuk Mobilyaları ile İlgili Ebeveyn Görüşleri ve Öngörülen Mobilya Tasarım Ölçütleri, *Zonguldak Karaelmas University, Karabük Technical Education Faculty Journal of Technology*, Volume:7, Number:1, pp:139-149.
- [19] Kurtoğlu, A., (2006). Furniture Industry Undergraduate Lecture Notes, İ.Ü. Orman Department of Industrial Engineering, Unpublished.
- [20] Hastürk, E.Y., (2012). Çocuk Mobilyası Satın Alımında Ailelerin Etkisi ve Çocukların Tercihleri, *Journal of Polytechnic*, Volume:15 Number:2, pp:105-110.