

Analysis of everyday clothes usage conditions

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Summary. This article suggests the study results of conditions of everyday clothing usage depending on the type of 3-7 year old children's activities on the playground. The purpose of defining game conditions was to determine the characteristic movements of children, which is necessary to develop special clothing as a means of protection from hazardous and harmful factors on playgrounds, and increase durability in certain places. Conditions of outdoor games depend on the place, weather conditions (temperature, humidity), the availability and installation of playgrounds etc. All this, as well as the physiological characteristics of the child, determine the requirements to design comfortable children's clothing for everyday use. Collection of information held by the method of Kurenova S. and Beskorovayna G., revealed the basic movements that children make in the game. They were classified as: running; movements, sitting "squatting" (sit-ups); movements, sitting on the buttocks; movements, sitting on the knees; climbing; climbing over the barrier; lap movements, only seven dynamic poses. An analysis of ergonomic postures found that the greatest burden on clothes are caused by movements 2, 4, 5, 6 and 7, that is, run on your lap. Thus, studies of children's clothes in operation showed that textile material in the area of the knee is the most vulnerable to premature wear and failure. Therefore, the design of children's casual pants destination should be paid attention to improving the performance properties of the front half of the product in the knee.

Key words: children's clothing, operating conditions, activity games, dangerous and harmful factors, wear resistance.

INTRODUCTION

In the operation, various garments are worn-out, which leads to changes in the structure of textile materials, components or separate technical units which are functionally useless. In this connection, wear and tear of clothing is divided into general and local. General wear and tear is the result of destructive processes (aging) that continuously affects the macro- and microstructure of fiber systems, and local, which is characterized by the formation of lesions only in some places with sufficient strength and integrity of a large part of the material. General and local wear is a function of time, and therefore not every fracture, which occurs immediately or in a short operating period should be regarded as a textile material degradation [2, 10-13].

THE ANALYSIS OF RECENT RESEARCHES AND PUBLICATIONS

Production of children's clothing must meet the requirements of state sanitary norms and rules [1]. However, due to difficult economic situation in the country the domestic market is by almost 90% filled with imported products of illegal origin, which do not always meet the quality and safety requirements [1]. In this regard, for children's clothes for everyday use are produced with textile materials with properties that lead to a decrease in physical-mechanical and operational performance, which leads to premature wear of the products. In addition, the level of wear and tear increases with their contact with dangerous factors of playgrounds (slides, sandboxes, asphalt, etc.) and characteristic movements of children at 71,5 % performed on knees, prompting the knee area to be more vulnerable to fracture.

Despite of a sufficient number of methods to protect the knee area, the problem remains unsolved due to the fact that their use is monofunctional, characterized only by negligible additional protection material in dangerous and critical areas of the product from premature wear, as well as becoming unusable, creating discomfort operation. As for the knee, where preschool child spends most of his time in the play, they are protection from contact with relief and abrasive surfaces is almost absent. In addition, the knee joints, as the most traumatic zone, must be protected from the influence of its own weight of the child and random loads, which is obviously.

The problems of the modern design of children's clothes are studied by Suprun N., Slavinska A., Yaroshchuk A., Beskorovayna G. and others. But because domestic enterprises use mostly imported textiles, the issue of improving the performance properties of children's clothing remains valid. Problems of clothes wear and tear, and the advancement of materials durability are studied by Semak B., Halyk I., Suprun N., Kolosnichenko M., Mychko A., Deineka I., Golubchikova A., Semenchenko G. and other. But since there is now a trend of premature clothes wear and tear, determining the causes and therefore the need to study them is obvious.

OBJECTIVES

The purpose of defining the conditions of 3-7 year-old children's games was to determine the characteristic movements of children, which is necessary to develop special clothing as a means of protection from hazardous and harmful factors, and increase durability in certain places.

THE MAIN RESULTS OF THE RESEARCH

In the process of exploitation, various garments are worn-out, which leads to changes in the structure of textile materials, components or separate technical units which are functionally useless. In this regard, the wear and tear is divided into general and local. Moreover, the overall deterioration is the result of destructive processes (aging) that continuously affect the macro- and microstructure of fiber systems, and local, which is characterized by the formation of lesions only in some places with sufficient strength and integrity of a large part of the material. It should also be noted that the general and local wear is a function of time, and therefore not every fracture, which occurs immediately or in a short operating period should be regarded as a textile material degradation. This might be an accident, for a reasonable interpretation between deterioration and destruction using a concept such as wear resistance of textile materials, characterized by their ability to resist this process under given conditions and exploitation of research [10-11, 14-15].

The main causes of wear and tear of any and all fiber systems should be considered permanent or periodic effect of various hazardous and harmful factors. Depending on the nature they are divided into four groups most frequent signs of wear characteristics for textiles should be considered as such that are available, that are visible and reflect the actual destruction of macrostructure, such as abrasions and holes.

The destruction of the sample material from scuffs is typical at the time of the obligatory loss of weight and thickness, and hole formation may occur regardless of the type of modified factors. Therefore, to determine the magnitude of changes in this case, we may use the tearing load, thickness and weight of the sample compared to baseline characteristics. If the destruction is not available, but at the level of the fine structure (microstructure), which is typical physicochemical factors is to estimate the degree of destruction is changing solution of viscosity worn material, i.e. viscosimeter, the essence of which is based on the relationship between the values specified specifications dissolved of the sample and the solvent. In the case where the solution of the samples viscosity has decreased, it shows the destruction of the fibrous component at the molecular level [2]. But the most affordable modeling of the impact of the change properties of textile materials is the study of the process of wear in the laboratory and directly in the operation of the finished products to the specific factors. In carrying out the specified tests, samples of textile material completely destroyed with further assessment of their endurance and longevity [20]. It should be noted that in some cases, such as during accelerated research experiment allowed partial tests during the set time or set number of factors specific interaction with subsequent

old children movements in children is low, which often leads to injury and, consequently, the destruction of clothes. Starting from 5 years old the trend of premature wear of tissue in certain areas of garments, especially garments of everyday use for boys, especially pants [16].

such as the physical, chemical, mechanical, biological and combined.

Among the groups specified sufficiently influential to textile material are the physicochemical ones, which primarily include oxygen atmosphere insolation, radiation emission, ironing, use of chemicals (trichlorethylene, Perchlorethylene, detergents) for cleaning etc.

Mechanical factors are a group of processes such as tissue abrasion on the surface and on the bends, and tearing loads, the influence of elastic, plastic, deformations and more.

The biological factors include bacteria and insects that are also capable of destroying different fibrous material.

With regard to combined factors, the specified group may be plural, thanks to the inclusion in its membership of other groups that act simultaneously and therefore also the most influential in the process of wearing textiles, fibers and garments [3-4].

To assess the durability of materials specified using criteria such as mechanical (single and multi-cycle, half-cycle tearing and non-tearing characteristics), physical (hygroscopic, diffusion, thermal, optical and other properties), chemical (change of viscosity solutions), the presence and quantity of through-destruction etc.

Thus, the determination of the extent of their damage. However, since the wear resistance of textile materials depends mainly on the nature of operating in these factors, the frequency and time of exposure, in practice changing their properties studied using kinetic characteristics that provide information not only on the initial performance of prototypes, but their value in the experiments. In this regard, it is clear that the choice of basic NShCh, most affecting textiles garments, as well as assessment criteria of changing their properties must be scientific and reasonable.

Clothes for preschool age children, which is used in everyday life and during different types of play in the gardens, on playgrounds prematurely becomes unusable, especially such product as pants [1]. Lifecycle of pants does not only depend on the variety of textile materials, design features of the product [2], exposure to hazardous and harmful factors, but also on the age group of specific customers. In this connection it is necessary to analyze the conditions and types of kids.

According to the classification of standard figures of boys and girls, there are five age groups: nursery (under 3 years), preschool (from 3 years to 6 years and 11 months), primary school (from 7 years to 11 years and 6 months), high school (11 years and 7 months to 14 years 6 months), youth (14 years and 7 months to 17 years and 11 months).

Preschool children are a special group of users of textiles [5-9]. This period differs rapid development of the mobile activity, but control over the adequacy of 3-4 year-

The main activities of preschool children is playing (Fig. 1). It can be running, playing in sandboxes, playgrounds, climbing trees, crawling etc.



a



b



c



d

Fig. 1. Children activities on playgrounds:
a – riding on slides; b – running; c – riding on carousels;
d – playing in sandboxes

An analysis of day schedule [17-19] found that the time allotted for children of preschool age to play in terms of the street is at least 4-5 hours a day.

Conditions of play outdoors depending on their place of, weather conditions (temperature, humidity) the availability and installation of playgrounds and more. All this and physiological characteristics of the child determines the requirements to design comfortable children's clothing for every day.

Analysis of the conditions of play, characteristic movements, as well as dangerous and harmful factors affecting the degree of children's clothes durability were carried out on playgrounds in Lugansk, Severodonetsk, Kyiv, Odessa, Kharkov, Yevpatoriia, outside Ukraine - in Istanbul (Turkey), Thessaloniki (Greece), etc., as well as directly in kindergartens number 36, 38, 45 m. Lugansk (Ukraine).

The existing classification of movements which

apply to domestic, industrial and sports activities of adults can not be used when selecting movements for their children through a quality difference. Therefore, to solve this problem we have conducted a statistical analysis of complex movements that serve children of preschool age group during the day, depending on the operation of the musculoskeletal system.

Thus, information gathering, which was conducted by the method of Kurenova S. and Beskorovayna G. [6, 21], revealed major movements that children make in the game. They were identified as running, sitting, climbing, kneeling movements, etc. – all seven dynamic postures (Table. 1).

Table 1. Typical movements of preschool children in the game

№	Movement types	Child's body position in the game	Movement signs
1	2	3	4
1	Running	Torso 55-60°. Arms bent at the elbows. Legs, knees bent, making repulsive.	
2	Squatting	Torso 30° vertically. Arms bent at the elbows. Legs fully bent at the knees.	
3	Movements sitting on buttocks	Torso 20-30°. Free hand movements. Legs straight.	
4	Movements sitting on knees	Torso 20-45°. Free hand movements. Legs totally bent in the knees.	
5	Climbing	Torso 20-30°. Hands do grabbing movements. Legs bent at the knees, making rejection of the bearing surface	
6	Climbing over an obstacle (climbing on the obstacle, overcoming it, coming down the obstacle)	Torso 20-30°. Hands and feet do reciprocal movements. Legs also make rejection of the bearing surface.	
7	Movements standing on the knees	Torso 80-90°. Hands and knees rest on a supporting surface.	

Analysis of 3-7 year-old children's activities has shown that the pants, as a kind of casual wear, are most frequently used not only boys but also girls. Due to the fact that at this age children's moves are more diverse and complex than in early childhood, clothes are more often in contact with the environment, including soil, sand, asphalt, gravel, wood etc. Therefore there is a need to

determine the influence of factors that cause premature wear and tear and destruction of children's clothing (pants).

Analysis of the existing range of children's clothes and study of its wear and tear resistant properties as the main indicator of quality is complex and multifaceted task. Also of great importance is the compliance with technical requirements for products that ensure their compliance with operating conditions [6, 19].

Children's clothing must be made according to state health standards and regulations [17-18], but at present these requirements are ignored by firms that manufacture clothing of the given range.

To install the typical design of the children's clothes of preschool age group for daily use, there has been carried out the analysis of existing options in the amount of 120 models. The basic types of wear and their design features defined shape, silhouette, cut, and the location of the damaged areas of clothing. The results of quantitative analysis, according to figures, are presented in Fig. 2.

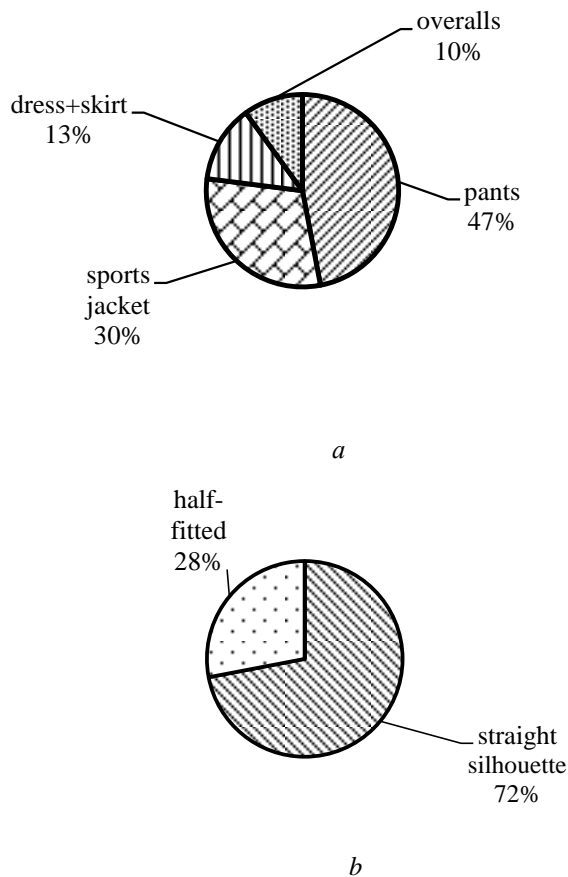


Fig. 2. Frequency of usage: a – kinds of children's wear for everyday use; b – silhouettes

Analysis was conducted among clothing that children wear often, that is in spring and autumn. It has been established that the terms of use and destruction there often prevail such type of clothing as pants (47%). Children's pants for both boys and girls can be with different horizontal and vertical articulation (Fig. 3).

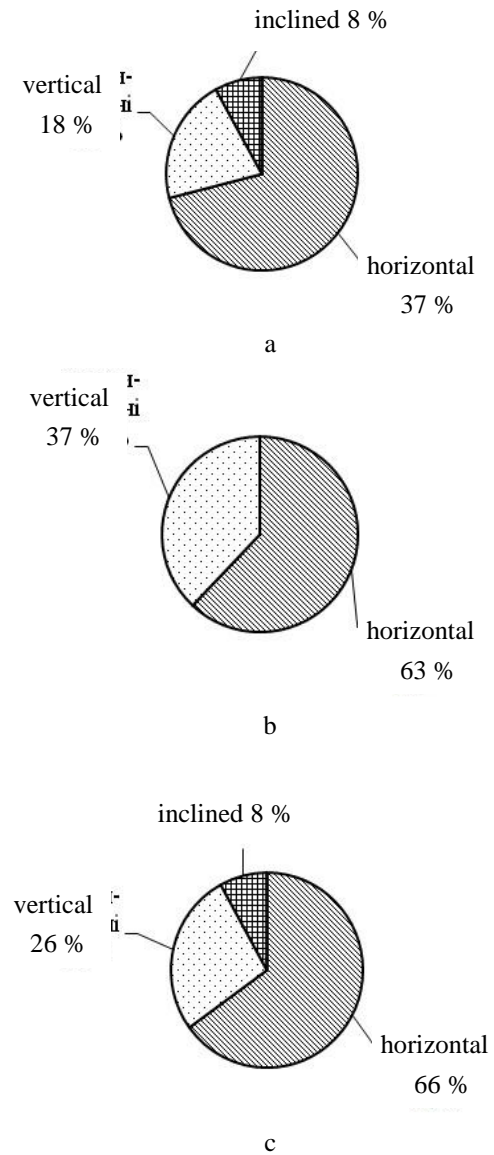


Fig. 3. Frequency of usage of articulation forms for children's clothing: a – Front; b – Rear; c – for the whole product (pants)

According to the analysis of construction project often children pants straight silhouette (72%), with horizontal division (74% Front, 63% Rear, 66% for the whole product).

Pants with belt or an elastic band can have different kinds of pockets (invoiced with detachable sideways, with leaves) of different configurations (with sharp corners, rounded, sloping or horizontal line input) and size. Location of pockets may be on the front of pants symmetrically or asymmetrically, on the back, on the side seams. Slide preferably with a zipper. Sealing mostly absent. (Fig. 4).

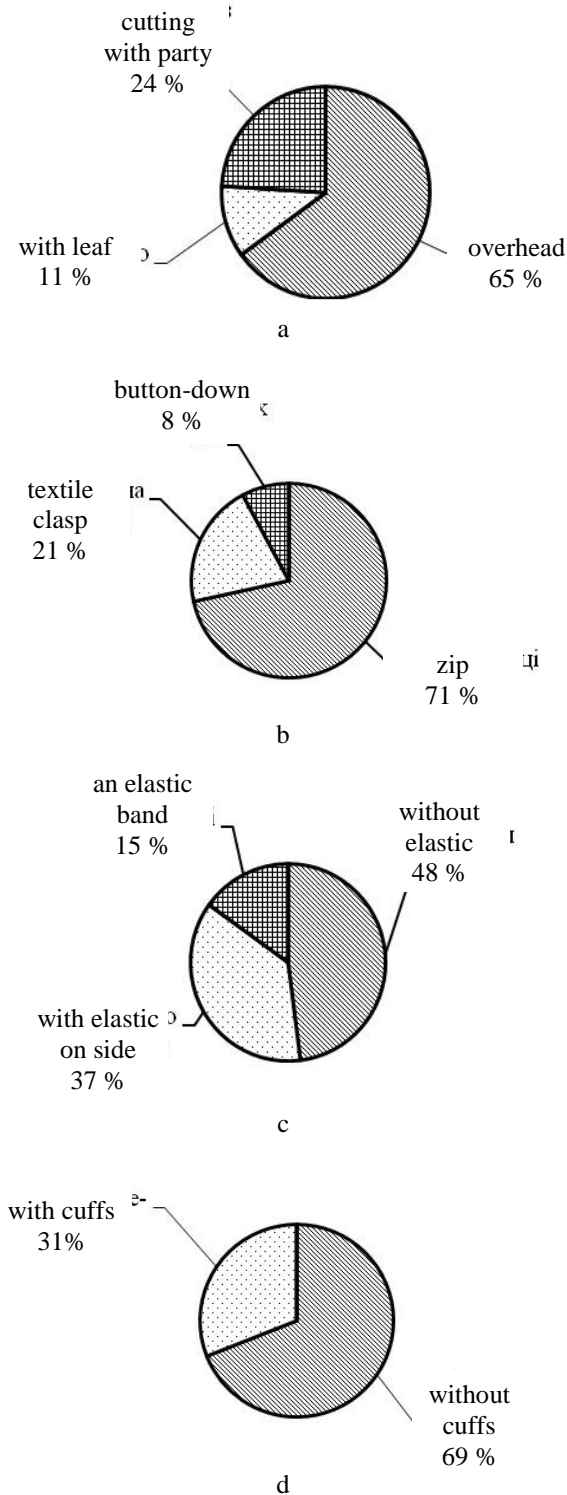


Fig. 4. Frequency of structural and technological elements of pants: a – kind of a pocket; b – type of fasteners; c – type of belt; d – bottom of the product

Thus, the analysis of structural and technological characteristics of clothing for children of preschool age for daily use we can see (Fig. 2-4), that existing products are diverse in appearance and completeness, but because their design and modeling features should consider reasonable conditions of play kids. It is also important to substantiate the type of material in accordance with

sanitary regulations and operating conditions, which combined with rational design and features model will increase the wear resistance of these products.

CONCLUSIONS

1. The main causes of deterioration of fiber should be considered permanent or periodic effect of various hazardous and harmful factors. Depending on the nature, they are divided into four groups: physical, chemical, mechanical, biological and combined.

2. Textile material is most influenced by physical and chemical factors. They are the oxygen in the atmosphere, insolation, radiation emission, ironing, use of chemicals, detergents for cleaning etc.

3. To assess the durability of of the specified materials there can be used the criteria such as mechanical (single and multi-cycle, half-cycle, tearing and non-tearing characteristics), physical (hygroscopic, diffusion, thermal, optical and other properties), chemical (change of viscosity solutions), the presence and quantity of through-destructions etc.

4. The most common signs of wear characteristics for textiles should be considered as such that are available and reflect macrostructure destruction, such as abrasions and holes.

5. The destruction of the sample material from scuffs wear is typical at the time of the obligatory loss of weight and thickness, and hole formation may occur regardless of the type of modified factors.

6. To determine the magnitude of changes, in this case, there are used tearing loads, thickness and weight of the sample compared to baseline characteristics.

7. From the analysis of ergonomic postures it has been found that the greatest burden on clothes are caused by movements 2, 4, 5, 6 and 7, that is, those that are performed on the knees (Table. 1).

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Анализ условий эксплуатации одежды повседневного назначения

Галина Рипка

Аннотация. В статье представлены результаты исследования условий эксплуатации одежды повседневного назначения в зависимости от вида деятельности детей 3-7 лет на игровых площадках. Целью изучения условий игровой деятельности было определение характерных движений детей, для которых необходима разработка специальной одежды как средства защиты от опасных и вредных факторов игровых площадок, и повышение износостойкости в определенных местах. Условия игры на свежем воздухе зависят от места их проведения, метеорологических условий (температуры, влажности воздуха), наличия и обустройства игровых площадок и т. п. Все это, а также психофизиологические особенности ребенка определяет требования, предъявляемые к разработке комфортной детской одежды на каждый день. Сбор информации, который проводился по методике Курёновой С.В. и Бескоровайной Г.П., позволил установить основные движения, которые делают дети в процессе игры. К ним были отнесены бег; движения, сидя «на корточках» (приседания) движения, сидя на ягодицах; движения, сидя на коленях; лазания; перелезания через препятствие; движения на коленях, всего семь динамических поз. Из анализа эргономических поз установлено, что наибольшую нагрузку на одежду оказывают движения 2, 4, 5, 6 и 7, то есть те, которые выполняются на коленях.

Итак, проведенные исследования детской одежды в условиях эксплуатации показали, что текстильный материал в зоне коленных суставов является наиболее уязвимым к преждевременному износу и разрушению. Поэтому, при проектировании детских брюк повседневного назначения необходимо уделить внимание повышению эксплуатационных свойств передней половинки изделия в области коленных суставов.

Ключевые слова: детская одежда, условия эксплуатации, игровая деятельность, опасные и вредные факторы, износостойкость.