THE DESIGN OF APPAREL PRODUCTS FOR PREMATURE BABIES

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Abstract: *This paper presents the design process of custom clothing product for premature babies. The study is based on the results obtained from theoretical and applied research regarding. These babies must stay in incubators for a long period of time and for this reason, they must wear functionally tailored garments suitable for these conditions. The clothes they wear are made from natural materials, perfectly adapted to the technological, physiological and anthropo- morphological requirements as well as to the medical equipment used in neonatal medicine. These clothes must be easy to put on or take off with few manipulations. The functional clothes, which are presented in this paper, were tested under clinical conditions, being very well appreciated by the medical personnel and by the parents.*

Keywords: *preterm babies, functional apparel products.*

INTRODUCTION

The design of adaptive clothing with high optional features represents a direction of the modern scientific research. The single-use adaptive clothing or multiple use adaptive clothing is designed with specific requirements of the groups that will wear them, but with the help of the artistic, constructive and technological solutions, it is perfectly suited to the anthropo- morphological characteristics of the babies and the wearer's usage conditions by facilitating the process of putting them on or off, and the required maintenance and medical procedures.
The aim of the research is the design of some adaptive clothing with high functional features for the premature children or for those who were born with low body mass, which can be used to the incubator intensive applications' conditions. The actuality of the presented research results from the today's analysis in this domain in the Republic of Moldova and worldwide, in the context of intensifying the efforts of the medical institutions and the parents' efforts regarding the increase in the survival and rehabilitation chances of the premature children. By taking into account the statistical data, showing the increase in the number of the premature births and the activities done by the medical institutions to increase the degree of the successful survival of the children born prematurely, the research results come to contribute to the improvement of the state of the premature child from the incubator with the help of the functional clothing products adapted to the requirements and conditions imposed. [1]

EXPERIMENTAL

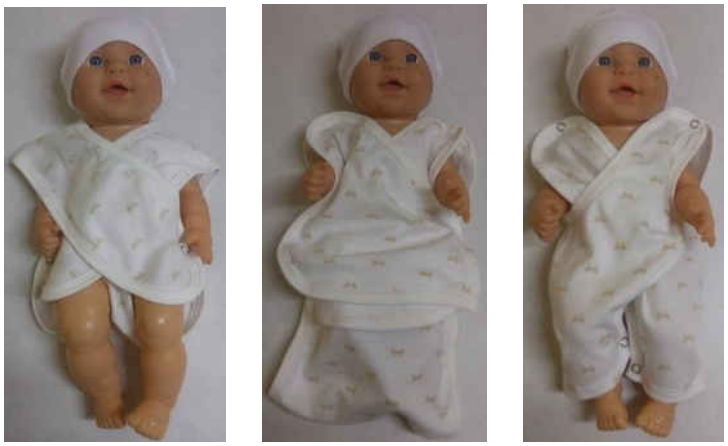
According to the World Health Organization the baby born prematurely is the baby born alive and earlier than 37 weeks of gestation, usually his (her) weight is less than 2,500 grams, is viable, and has the length between 35 and 47 cm. From morphfunctional, biological, neurological and metabolic points of view, he (she) is immature, not fully developed and which most often adapts with difficulties to extra uterine life, requiring special care at birth and postpartum. The preterm infants require special medical care efforts incomparably greater than that involved in newborn care, and the studies in the field have shown the need to establish a special therapy at birth and postpartum in case of preterm newborns by respecting the actual prenatal care standards in order to reduce the neonatal morbidity and mortality. The premature newborn care includes: stabilization of premature newborn, ensuring and maintaining heating, maintaining respiration, preventing infection and appropriate nutrition. [2]
The experimental studies have established some basic requirements imposed on the clothing products for premature babies. The morphological and physiological characteristics of the premature babies have been analyzed according to the degree of prematurity, the medical care conditions have been considered and the requirements imposed by medical personnel and by the parents have been analyzed.
The premature babies weighing more than 2000 grams, without serious problems, can be placed in special beds, being dressed in clothing products intended for infants covered with extra blankets for additional thermal insulation. [3,4]

The premature babies weighing less than 2000 grams are placed typically in incubators in intensive care departments that provide optimal conditions for the development of the premature babies. They are dressed in clothes intended for infants, but of a smaller size, due to the morphological and physiological characteristics of the premature babies, they require special medical care and medical network in the incubator, the usual clothing products being inadequate as from the anthropometric as well as from the functional point of view, often being cut in areas used for medical devices, or at the end of the products.
The basic requirements imposed on the apparel products for premature babies in incubators are the ergonomic, functional requirements, the products must possess high functional properties, as the medical staff could dress or undress the baby in less than a minute in particularly in emergency medical situations. The clothing products should ensure stable thermal insulation conditions, and through the constructive and technological solutions, they must reduce the heat losses providing access to certain zones of the body without having to undress the baby completely. The elements of the attached medical devices don't have to be affected by the manipulation of medical staff or by the child's movements. The clothing products must be adapted to changes in position of premature child specific to the child's age and movements, the dimensions of the products must be suitable for the anthropo- morphological, but the closure systems and the assembling types should be simple and should not damage the sensitive and immature skin of the premature baby.
The fabrics used to make the clothing products must possess high hygienic proprieties, must be soft, must provide thermal insulation, must be able to be sterilized and disinfected. The natural fabrics of cotton or flax can be proposed according to the analysis of specific characteristics.
The braiding system for maintaining the shape of the product was selected for the design of products because this system allows the possibility to obtain products based on planar elements and it excludes the seams that can be traumatic for the premature baby. This system also allows the increase of the degree of thermal insulation of the product by covering some parts of the body with several layers of fabrics. The products will be encased by folding the parts of the flat elements, forming soft holes for head, arms and legs, giving the possibility to move the arms and the legs without twisting or pressing the attached medical devices.
To close the product, it was selected the superimposed system with buttons placed on the edges of the flat elements, which will not have contact with the child's body and it is ergonomic. Also, it can be suggested the system of closing with Velcro tape, which must be soft, flexible, on a textile tape.
The products can be designed in one size, thanks to the adopted constructive solutions. The dimension of the length of 40 cm bodies was used, the proposed solutions being according to the premature babies, which have the weight less than 2000 grams.
In the context of experimental researches there have been designed several types of products that can be used for the babies placed in the incubator. A product designed for premature babies has been defined, which is being folded to form holes for head, arms and legs. It is a product type sack, which involves attaching some elements to form holes for head and arms covering the legs like coveralls. The dimensions of the products have been designed to ensure hygienic product usage.
The elements of the products have been processed through fringing, but the endings have been processed through coating seams.
An important aspect that can be recommended is the use of products in various pastel colors, which could show the child's age, being a supporting factor for the medical staff.

RESULTS AND DISCUSSION

The research has developed a system of functional clothing products adapted for premature babies, consisting of prema, sack and coverall products. [1] The basic models are shown in Figure 1.
The prema type product (fig. 1, a) is a plan element of a complex shape with fringing contours and covering seams, made of cotton knitted. The product is put on by folding the lower parts covering the baby's groin and abdomen region and by twisted folding of the upper parts we cover the baby's shoulders and trunk, by fixing through the overlay with the buttons on the side edges of the product. Thus, the shape of products is obtained by braiding, the sealing system is on the edges of the sides and with a button and it has no contact with the child's body, and the product has five holes: for head, arms and legs.
The sack type product (figura1, b) shows a lower rectangular element with a curve cut for the neck and two upper elements that may be attached with the help of the buttons on the upper lines of the shoulders and on the side edges. The product is put on by folding the lower parts, covering the baby's legs and abdomen by attaching the upper parts. Thus, the shape of the product is obtained by the braiding system and the closing is on side edges on the frontlines with one button and it has no contact with the baby's body, and it has three main holes: for head and for arms. The product gives access to the lower limbs through the formed holes by folding the lower parts.

The petticoat type product (fig. 1, c) is a plan element of a complex form with fringing contours and covering seams, made of cotton knitted. The product is put on by the cross folding of the side parts, covering the baby's torso, the shoulders, the arms and the legs and fixing through the overlay with the buttons on the higher shoulder edges and the inner edges in the legs' zone. Thus, the shape of the product is obtained through braiding, the sealing system is on the upper and inner edges with buttons and has no contact with the baby's body, and the product has five holes: for head, arms and legs.



a. b c

Figure 1: Clothes for premature baby: a – prema, b – sack, c - petticoat

The functional clothes for premature babies are intended for babies placed in the incubator. The products mentioned are made from natural fabrics and represent constructive and technological solutions adapted to the anthropo - morphological and physiological characteristics of the premature baby, being according to the medical care requirements in the Department of Neonatology Pediatrics and are compatible with the medical equipment from the neonatal medicine. The products can be put on and taken off easily and quickly as by the medical staff, as well as by the parents without manipulations that would traumatize the baby. The products show no assembling seams that might traumatize the skin of the child, their form is obtained through braiding or via attachment or detachment of some elements, the sealing system and the edges are not in direct contact with the body, all of these features provide functionality and a high ergonomic correspondence of the products.
The adaptive clothing products for premature children might also provide psychological and moral support for the parents through the child's neat appearance, the use of several products adapted as dimensionally as morphologically.

The functional clothing products for premature babies are:

1) adapted to the conditions of wearing and treatment in the incubator by palpation, size and shape.
2) they represent components necessary for the premature child care by making the holes in places where specific medical devices are attached in the process wearing.
3) they contribute to the increase of the survival chances of the premature babies through correct positioning of the medical devices and facilitating rapid elimination of the product in medical emergencies.

The original constructive and technological solutions:

1) provide thermal and hygienic comfort necessary for premature children through the overlay of multiple layers of fabrics in the trunk, arms and legs regions, the use of some natural fabrics, and soft covering seams for the product's edges;
2) offer an anthropometric correspondence as for the baby's static positions of the child, as well as for his (her) dynamics by size, shape and the system of obtaining the form through braiding;
3) the braiding system and the closing system with buttons allow attaching the necessary medical devices and reduce the dressing and undressing time in medical emergency situations.

CONCLUSIONS

The design of adaptive clothing products for premature children implies the use of the systemic approach principles to meet the complex system of requirements imposed on these types of products.

The adaptive clothing products developed for children born prematurely are aimed at children placed in the incubator and correspond to the constructive and technological solutions that are original for all functions and requirements imposed to ensure the facilitation of medical care and monitoring the vital condition of the baby, as well as the psychological and emotional support for parents.

The clothes they wear are made from natural materials, perfectly adapted to the technological, physiological and anthropo- morphological requirements as well as to the medical equipment used in neonatal medicine. These clothes must be easy to put on or take off with few manipulations, because it is important to avoid any traumatisation of the child.

The functional clothes, which are presented in this paper, were tested under clinical conditions, being very well appreciated by the medical personnel and by the parents.

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