# DEVELOPMENT OF ADAPTIVE SCHOOL UNIFORMS FOR CHILDREN WITH CEREBRAL PALSY

**DISSERTATION SUBMITTED**

**In partial Fulfillment of the Requirement for the**

**award of the Degree**

**MASTER'S PROGRAMME IN FASHION DESIGNING**

**BY**

**ARYA SREE K**

**(Register No. SM22MFD005)**

**DEPARTMENT OF FASHION DESIGNING**

**WOMEN'S STUDY CENTRE**

**ST. TERESA'S COLLEGE (AUTONOMOUS)**

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**APRIL 2024**

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**Name and Signature**
**of External Examiner**

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**APRIL 2024**

**Name and Signature of**
**Head of the Department**

**Name and Signature of Guide**

# DECLARATION

I, Arya Sree K, hereby declare that the project entitled “Development of Adaptive School Uniforms for Children with Cerebral Palsy” is submitted in partial fulfilment of the requirement for the award of the Degree of Master’s Programme in Fashion Designing. This record is original research done by me under the supervision and guidance of Ms. Nair Supriya Damodaran, Assistant Professor, Department of Fashion Designing, St. Teresa's College, Ernakulam. This work has not been submitted in part or full or any other Degree, Diploma, Associateship/Fellowship of this or any other university.

Name and signature of the candidate  Name and signature of the Guide

Place :

Date :

# ACKNOWLEDGEMENT

I bow my head before God Almighty whose grace and blessing enabled me to complete this project successfully. I am grateful for those who helped me to grab the right opportunity and complete the process in right time.

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# ABSTRACT

Cerebral palsy (CP) involves a range of conditions that affects an individual's movement, balance, and posture. It stems from damage or irregularities in the developing brain that occur before, during, or shortly after birth. This damage can affect various brain parts responsible for movement and coordination, such as the cerebrum, cerebellum, and basal ganglia. Adaptive clothing, also referred to as adaptive apparel, is clothing tailored to meet the specific needs and difficulties faced by people with physical or cognitive impairments. It is designed to provide comfort, facilitate ease of use, and promote greater independence in dressing for individuals with varying abilities. In today's market adaptive uniform clothing is hard to find. In the present study, the researcher has tried to study and understand about the clothing problems faced by children with cerebral palsy by conducting a survey to know about their clothing preferences and problems. The samples selected for the present study were students affected with cerebral palsy from special schools in Ernakulam. Based on the survey conducted using a questionnaire, 14 garments were designed for both girls and boys and from that two products were selected for construction. The two products were an adaptive uniform wear for a boy and a girl with cerebral palsy with an age group of 9-10 years. Fourteen sketches were developed using Adobe Illustrator. Designing of the garments were on the basis of problems faced by children affected with cerebral palsy such as hyperactivity, uneasiness, hand and leg stiffness condition, size issues, instructions, difficult to identify button holes, unbuttoning the garment, wearing difficulties and coordination issues. Paper patterns of the selected designs were developed by flat pattern making method. The designs were cut on the cotton fabric to make the selected products. The researcher developed an adaptive uniform wear for a boy and a girl with cerebral palsy based on all the collected information.

Key Words – *Cerebral Palsy, Children, Adaptive Uniforms, Clothing Preferences*

# INTRODUCTION

## 1.1 CEREBRAL PALSY

Cerebral palsy (CP) is a cluster of neurological conditions that impact millions of people worldwide. A disease that damage brain development resulting problems in movement, muscle tone and motor skills which can happen during pregnancy or quickly after birth. Because of this individuals with cp suffer from particular challenges in thier daily lives, but for a meaningful and satisfying life proper understanding, support and treatment are needed.

major reasons for cerebral palsy are ranging from genetic problems and prenatal infections, maternal health issues and delivery complications. impairment of the brain's motor centers, which leads to difficulty in controlling muscles and its movements. these problems can be seen in various forms like spasticity, dyskinesia, ataxia and mixed types of these symptoms. living with cerebral palsy can be challenging in the physical and emotions of the individuals. easy activities like walking, talking, or eating which can be difficult for them to do themselves and need help or assistant support. due to these health issues the restrict in normal social interactions, education, employment opportunities and overall.

people affected with cerebral palsy have a ray of hope by early detection and therapeutic interventions. providing physical therapy for mobility, strength, and flexibility. speech therapy helps with communication difficulties and recently assistive technology with innovative solutions has been introduced to smoothen their lives.

Beyond the monarchy of treatment, advocacy efforts play a paramount part in raising awareness, promoting inclusion, and advocating for the rights and needs of individuals with cerebral palsy.

The first recorded case was dated back centuires ago but as a clear medical term as developed recently. it was not properly identified til 19th century after that medical terms gave more consideration about neurological diseases. the wrd cerebral palsy was invented by sir william john little, who is an English orthopaedic surgeon during the mid-19th century. he noticed certain symptoms in children such as spasticity, weakness, co ordination starting from an earlier age and he connected these symptom with complications during birth. little research led to advanced research in this condition. One of the initial cases filed of cerebral palsy is a boy named William John West, who was born in England, 1836. His case was reported by Sir William Osler, a famous

physician in his textbook The Cerebral Palsies of Children published in 1889. Osler described clinical matters and the main causes of cerebral palsy. professionals in medicine started learning more about this condition and bringing advanced facilities. such as, CT scan and MRI which helps to know more about the brain issues related to cerebral palsy. nowadays most common childhood neurological disease is cerebral palsy which affects millions of people in the world. the main reason for this disease may differ according to the identification.

## 1.2 ADAPTIVE CLOTHING UNIFORMS

Adaptive clothing uniforms are specially designed garments tailored to meet the unique needs of individuals with disabilities or mobility challenges. Not only are adaptive clothes uniforms useful, but they also boost the wearer's self-esteem and general well-being.

Dressing themselves is one of the major challenges faced by children with cerebral palsy. traditional clothing affects their needs like fit which leads to discomfort and blocks their independence. The developing adaptive clothing uniform designed for cp provides a required solution to meet their challenges. functionality, comfort, and accessibility are the main consideration for these types of garments. designed with soft stretchable fabric which give great flexibility are adaptive uniforms. furthermore, velcro fasteners and elasric waistbands are given for comfortable use of the wearer.

## 1.3 PURPOSE OF THE STUDY

Cerebral palsy (CP) is a neurological disorder that affects movement, posture, and muscle coordination. Children with CP face challenges in daily activities, including dressing themselves. Children with cerebral palsy may express a variety of symptoms while dressing due to their physical condition. Symptoms can vary depending on the severity and type of cerebral palsy.

The purpose of the study is to understand the clothing difficulties and problems faced by children with cerebral palsy by conducting a survey and to design and develop appropriate designs for adaptive clothing uniforms and construct them to provide a solution for their clothing problems.

## 1.4 OBJECTIVES

• To study clothing difficulties faced by children having cerebral palsy.

• To survey to understand the clothing problems and preferences of children with cerebral palsy.

• To analyze the data and design appropriate adaptive uniforms for children with cerebral palsy.

• To construct an adaptive uniform each for a girl and a boy affected with cerebral palsy.

# REVIEW OF LITERATURE

Cerebral palsy, often abbreviated as CP, manifests uniquely in each person, resulting in a spectrum of effects that extend from mild to severe. Some individuals may exhibit hardly noticeable impairments, while others may experience perceptible challenges with movement and stiffness, yet still manage a relatively independent lifestyle. At the other end of the spectrum, some individuals may face subtle limitations, rendering them unable to move independently. The wide range of presentations makes understanding, diagnosing, treating, and predicting outcomes for CP exceedingly complex.

This condition typically appears during childhood, sometimes from birth, and perseveres throughout life. However, predicting the severity of CP in a child's early years is challenging, as the full extent of their disability becomes clearer as they grow. This dubiety often contributes to the frustration and confusion experienced by caregivers, who attempt to provide the best possible support for their child's development and well-being.

## 2.1 CEREBRAL PALSY

Cerebral palsy is described by challenges in movement control. the problem that appears due to damage in the brain befor or during birth or in initial five years of life which may lead to muscle stiifness, irregular movements, motor functions. the major reason for cerebral palsy is motor impairments. furthermore, disabilities due to the damage in the particular areas for motor control may face visual or auditory impairments, sensory processing issues and delay in language development are common symptoms. Cerebral palsy can result in brain injury from a variety of causes, with up to 50% of cases currently unknown. The following are a few of the most often found causes:

Prenatal Causes (Before Birth)

Hemorrhage: In infants, cerebral palsy is frequently caused by bleeding in a particular area of the brain.

Pregnancy-related infection: It is possible for an infection, such as the cytomegalovirus (CMV), to spread from mother to fetus. This herpes family virus is generally harmless, but in rarecases, if it is transferred to a fetus, it may cause brain damage. German measles (rubella), another well-known virus, can infect a fetus while it is still inside the mother, most likely causing brain injury.

Perinatal Causes (At or Around the Time of Birth: 28 Weeks of Pregnancy to Around One Month After Birth)

Lack Of Oxygen to The Brain (Asphyxia): Lack of oxygen is a common reason in cases where there are struggles at birth, such as the umbilical cord being wrapped around the child's neck, the mother hemorrhaging before the baby has been securely delivered, or contractions which are so tough that the supply of oxygen from the placenta is reduced.

Postnatal Cause (In the First Five Years of Life)

Head Injury: Head traumas hhappened during the first five years of life may result in cerebral palsy (CP).

Infection: Meningitis and other illnesses connected in early life can lead to cerebral palsy (CP).

Oxygen deprivation: cerebral palsy (CP) can result from situations in which the brain is temporarily oxygen reduced. These situations can occur from choking episodes or accidents that occur within the first five years of life.

Other types of cerebral palsy

Less usual types of cerebral palsy include dystonia, characterized by irregular posture distortion, which may coexist with other CP types, chorea, involving impulsive jerking of fingers and toes, ballism's, featuring uncontrolled joint movements, rigidity, where limbs are stiff like lead pipes or occasionally resist passive motion, tremor, and atonia, similar to athetosis and often progressing into it.

Topographical classification

Cerebral palsy is generally classified topographically, concentrating on affected body parts and the severity of the impairment, outlined as follows:

Quadriplegia: involving impairment in all four limbs.

Diplegia: affecting all four limbs, with the legs more severely impacted than arms, often observed in cases of CP rooting from premature birth.

Paraplegia: resulting in impairment in both legs.

Trilegia: involving impairment in both legs.

A sickness that only affects one side of the body is called hemipelagia. This kind of cerebral hemorrhage could happen prenatally.

A single limb is affected by monoplegia.

Other common factors

Injury to brain areas other than those controlling motor function commonly results in additional damages. These problems could include difficulties developing speech, visual or auditory problems, hearing loss, different levels of seizures, and learning disabilities. Furthermore, people with CP may suffer with dyslexia or other problems managing written language. Severe circumstances carry the issues of bone abnormalities due to muscular issues. A child's intellectual capacity, communication delay may result from motor abnormalities affecting the muscles that control the movement of the tongue and lips.
(Stanton, Marion. (2012).

## 2.2 HISTORY

The origins of cerebral palsy trace back to ancient Egypt, with the portrayal of individuals exhibiting what is now identified as spastic cerebral palsy dating as far back as the fifth century BC. In the current era, orthopaedic surgeon William John Ittle, who himself experienced an equinus deformity due to early childhood poliomyelitis, provided the initial descriptions of CP in 1843. Little's quest to remedy his deformity led him to study under French orthopaedic surgeon Jacques Delpeche, who focused on surgical corrections for equinus deformities, notably through Achilles tendon tenotomies. Following the successful correction of his deformity by German orthopaedic surgeon George Stromeyer, Little refined Stromeyer's surgical techniques and established the Orthopaedic Institution in London. Little's dedication to orthopaedic deformities positioned him as a pioneer in orthopaedic surgery and the first to identify spastic paralysis. His treatise, "On the Influence of Abnormal Parturition, Difficult Labor, Premature Birth, and Asphyxia Neonatorum on the Mental and Physical Condition of the Child," proposed a link between childhood deformities and anoxia resulting from trauma during labor and delivery. For many years, spasticdiplegia was commonly referred to as Little's disease.

Sir William Osler, a British physician, is attributed with coining the term "cerebral palsy" in 1889, as he described 151 patients bothered by the condition. Sigmund Freud, renowned as a neurologist and primarily known as a psychoanalyst, contributed to the limited understanding of CP by drafting numerous articles on the subject. Freud differed with Little regarding its aetiology, noting that children with CP were often introduced to various neurological conditions such as intellectual disabilities, visual impairment,

and epilepsy. He proposed that CP might arise from prenatal abnormalities in brain development. Freud categorized CP into three groups based on possible causes: maternal and idiopathic congenital; perinatal; and postnatal. He also came up with a classification system wherein "diplegia" encompassed all bilateral central origin disorders.

The American Academy of Cerebral Palsy (AACP) was established in 1947. In 1953, Minear surveyed AACP members and discovered diverse definitions of cerebral palsy. These definitions commonly acknowledged a broad spectrum of brain damage, primarily manifesting as motor dysfunction but also encompassing psychological, epileptic, and behavioral symptoms. However, transient abnormalities, neoplasms, progressive disorders, and spinal cord conditions were excluded from these definitions. Despite shared themes, a unified definition of CP did not emerge until nearly five years later, when the Little Club, an informal consortium of neurologists and others formed in the United Kingdom in 1957, proposed a comprehensive definition. The Little Club's definition aimed to facilitate knowledge sharing and research, stating that "Cerebral palsy is a persisting qualitative motor disorder due to non-progressive interference with the brain's development occurring before the completion of central nervous system growth." The Little Club's classification system included six categories: (1) spastic (hemiplegic, double hemiplegic, and diplegic); (2) dystonic; (3) choreoathetosis; (4) mixed; (5) ataxic; and (6) atonic CP. However, in the 1960s, CP underwent a redefinition process, yet inconsistencies in terminology persisted.

(Pakula-(2009).

## 2.3 ADAPTIVE CLOTHING

A disability refers to any condition that blocks a person's ability to execute certain activities or engage with the world around them. These conditions, known as impairments, can involve cognitive, developmental, intellectual, mental, physical, sensory, or a combination of factors. injuries leading to disability may be present at birth or develop over a person's lifetime. According to the World Health Organization (WHO), disabilities encompass impairments, activity limitations, and participation restrictions. An impairment is related to a problem in body function or structure; an activity limitation includes difficulty in performing a task or action; while a participation limitation refers to challenges experienced in engaging in the standard of

living. Disability is not simply a health issue; it is a complex interaction between a person's bodily features and the societal environment in which they live (WHO, 2016) As a result, disabilities often require specialized functional necessities for clothing and textile products. Clothing designed for individuals with impairments should provide greater freedom and independence while being fashionable. Since clothing serves as both adornment and a means of self-expression, it is significant for these products to be comfortable, visually appealing, stylish, easy to put on and take off accessible to all individuals with disabilities, safe, and adaptable to the wearer's physical requirements. Functional garments are designed to boost the quality of life and facilitate daily activities for individuals with disabilities or special needs, including wheelchair users paraplegics, arthritis sufferers, individuals with restricted movement, or stroke survivors. These garments are usually custom-made to ensure they meet the satique needs and comfort of the wearer. Wes-Min Chang outlined several requirements for this type of clothing

- Ensuring ease of independent dressing and undressing
- Accommodating variations in body features while maintaining testhanc consistency with regular clothing.
- Providing both physical and psychological comfort and stability
- Offering affordability and ease of care, including washing and maintenance
- Minimizing body odour retention through the use of natural fibres and antibacterial treatments

- Accommodating variations in body features while maingathetic constancy with regular clothing.

The term "adaptive clothing" refers to garments specifically designed to meet the medical needs of various populations, including post-surgery patients, individuals with disabilities, the elderly, rehabilitation patients, special needs children and adults, people with arthritis, and stroke survivors, among others. Adaptive clothing aims to provide convenient access to body parts without necessitating the removal of the entire garment, thereby supporting independent dressing and undressing for individuals with disabilities. For example, instead of traditional closures, adaptive clothing may combine features like Velcro and magnets. The primary goal is to promote independent dressing and personal care tasks while also simplifying the dressing process for

caregivers. Several design features should be taken into account when creating clothing for
individuals with disabilities: -

a) Aesthetic: Clothing plays an important role in appearance and provides a means of self-expression. Well-designed clothing can help hide potential disabilities and allow individuals to select styles suitable for various activities.

b) Comfort: Clothing should not create discomfort and should consider factors such as thermal insulation, breathability, tactile properties, freedom of movement, and pressure.

c) Protection: Certain garments should provide protection against environmental risks, such as outdoor clothing protecting against rain, wind, and cold, while curtains and sunshades provide protection against solar radiation.

d) Ease of movement: Clothing should allow for easy limb movement, with careful consideration given to joint placement to promote movement.

e) Easy access: Location of openings Front openings and seam openings should be strategically placed to ensure independent dressing and undressing. Type of fasteners Adaptive clothing should feature easy-to-use closures such as
Velcro, buttons, zippers with large pull tabs, and snaps to promote independence.

f) Quality: Investing in quality garments from reputable brands ensures durability and long-term cost-effectiveness, avoiding the need for frequent replacements.

g) Fit: Proper fit is important for comfort and mobility, with conscious to areas such as the crotch to avoid restricting movement.

h) Wear and tear: Clothing should be durable enough to withstand tension and tearing.

i) Price: Considering the limited purchasing power of individuals with disabilities, the affordability of functional adaptive clothing is essential.

j) Shopping facilities: Accessibility to clothing options may vary depending on location, with options ranging from in-store shopping to mail-order and assistance from caregivers.

The unsatisfied clothing needs of disabled individuals restrict their full participation in social activities, relationships, employment, and everyday life events. Adaptive clothing is designed to meet these needs by coordinating special properties, capacities, and functions such as antibacterial properties, proper humidity control, non-flammability, waterproofing, wear and cleaning resistance, and warmth retention. Furthermore, new adaptive clothing features easy-handling fastenings, quick-access

garment openings, strategically placed pockets, custom-curved trousers, slacks, and jackets, custom-shaped dresses and skirts, ponchos or custom-made coats, easy-fit undergarments and durable styled fabrics.

This specialized clothing ensures users' self-esteem by boosting independence in dressing and reduces the physical strain and workload of their caregivers. By serving clothing tailored to their specific needs, adaptive clothing helps disabled individuals to engage more fully in various characteristics of life and encourages greater participation and inclusion

(Poonia, N. (2020)

## 2.4 SENSORY ABILITIES IN CHILDREN WITH CEREBRAL PALSY

Cerebral palsy (CP) encloses a spectrum of movement and posture disorders, representing one of the most prevalent physical disabilities in childhood.

Dysfunction in sensory processing, coupled with motor deficiency, contributes to various abnormal functional behaviors in children with CP. When a child with CP experiences sensory disorders, it can affect perceptual skills, speech development, and emotional expression. Studies focusing on somatosensory deficits have highlighted tactile processing disorders in CP. However, identifying proprioceptive abilities and vestibular processing disorders is challenging due to neuro-motor deficits.

(Soomro, N., Kamran, B., Bibi, R., & Ahmed, S. I. (2011).

## 2.5 CONSIDERATION IN GARMENTS FOR THE DIFFERENTLY ABLED

Fashion and functional or adaptive clothing might seem like opposites, but for people with disabilities, fashion is just as crucial.

clothing made with consideration of the needs of disabled is adaptive clothing. eventhough fashion plays a crucial part in disabled people life also. clothing with fit,comfort independence are the major choice while choosing fabrics.

disabled people get treated differently or receive special attention which make them feel lonely. they may need any assitance which can make them single out. they prefer to live common and comfort living. Designers have brought various innovations in apparel for the differently abled, such as front-closing brassieres with Velcro fasteners, large buttons with buttonholes, oversized zipper pulls, open-back blouses and shirts, capes, snap-back shirts, expandable neck openings, garments with Velcro or side openings, dresses with half- open backs, kimono or raglan sleeves, tops featuring action

pleats in the sleeves and back, wheelchair capes, zip-up ties, and zip-up sneakers, among others.

## 2.6 DESIGNING GARMENTS FOR DISABLED PEOPLE

The range of products available for individuals with disabilities is often limited and does not always follow current fashion trends., several designers have, nevertheless, realized in recent years and produced useful, adaptable apparel. Experts in the field stress how critical it is to provide disabled people more independence at home, at work, and in the classroom.

The partnership between Tommy Hilfiger and fashion designer Mindy Scheir of Runway of Dreams, which led to the launch of the "Tommy Hilfiger adaptive clothing line for kids" in February 2016, is a significant development in this area. The purpose of this particular collection is to address the difficulties that the community of people with disabilities has when dressing. There are 22 items in the line for girls (sizes 4 to 18) and boys (sizes 4 to 20). The pieces have the same style, feel, and cost as the standard TH kid's collection. There are adjustable closures on the bottoms.

(Ayachit, S., & Thakur, M. (2017).

# METHODOLOGY

In order to accomplish the objectives of the study, the researcher has gone through the following steps;

- Selection of sample
- Survey to collect information and understand the clothing problems of children with Cerebral palsy
- Data analysis
- Design development
- Development of products

## 3.1 SELECTION OF SAMPLE

The sample selected for the study were children with cerebral palsy with an age group of 5 to 15. The sampling techniques used was snowball sampling or purposive sampling

technique. The researcher selected special schools in Ernakulam district. The names of the schools are Spring Fielding Therapy Centre- Autism Treatment Centre & Speech Therapy in Kochi, Prayatna Centre for Child Development, Palarivattom, Janey Centre Special School Eroor, Ernakulam, Mridula Sparsham Special School, Ernakulam, Amritha Institute for Differently Abled, Thoppumpady, Ernakulam.

## 3.2 SURVEY TO COLLECT INFORMATION AND UNDERSTANDING THE CLOTHING PROBLEMS OF CHILDREN WITH CEREBRAL PALSY

A questionnaire was developed to study and collect information about the clothing problems faced by the children with cerebral palsy. It also included questions to understand the clothing preferences of the children as well as the parents.

PLATE 1: SURVEY CONDUCTED AT AMRITA INSTITUTE FOR DIFFERENTLY ABLED

### 3.3 DATA ANALYSIS

The data was gathered by distributing questionnaires to parents and engaging in in-depth conversations with them to gain clear information of the clothing issues faced by children with cerebral palsy. The obtained data was entered into excel sheet and percentage analysis was done and presented using pie charts.

### 3.4 DESIGN DEVELOPMENT

Data analysis is the foundation for design development, from which final designs were designed and constructed. The majority of the respondents fell in the age group of 9 - 10 years and so the corresponding size of UK 7 was selected from the standard size measurement and the pattern was developed using the flat pattern method. so, the adaptive clothing uniforms were made based on the standard measurement size of 10 years old. Fourteen sketches were made manually using adobe illustrator in consideration of the comfortability of the children. While preparing the designs hyperactivity, uneasiness, hand and leg stiffness condition, difficult to identify button holes, unbuttoning the garment, wearing difficulties and coordination issues were also considered.

### 3.5 DEVELOPMENT OF PRODUCT

The chosen design’s paper patterns were drafted through the flat pattern-making technique. Cotton fabric was opted for the uniform, aligning with the parent’s preferences. Following the designs, appropriate fasteners were selected and incorporated accordingly.

PLATE 2: PATTERN MAKING

PLATE 3: TRACING THE PATTERN INTO FABRIC

PLATE 4: PRODUCT STITCHING

# RESULTS AND DISCUSSION

The study findings are analyzed under the following heading:

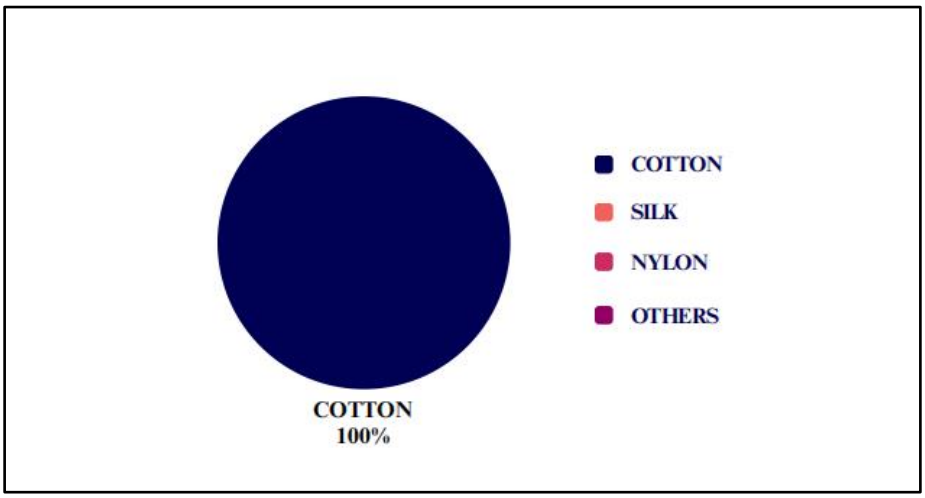
## 4.1 SURVEY TO COLLECT DATA AND UNDERSTAND THE CLOTHING PROBLEMS OF CHILDREN WITH CEREBRAL PALSY

The data was gathered by distributing questionnaires to parents and engaging with them directly through visits to specialized schools: Mridula Sparsham Ernakulam, and Amritha Institute for Differently Abled Thoppumpady. Also visited schools like Spring Fielding Therapy Centre- Autism Treatment Centre & Speech Therapy In Kochi, Prayatna Centre For Child Development Palarivattom, Ernakulam, Janey Centre special school Eroor, Ernakulam, but data unavailability were there due to lack of students with cerebral palsy.

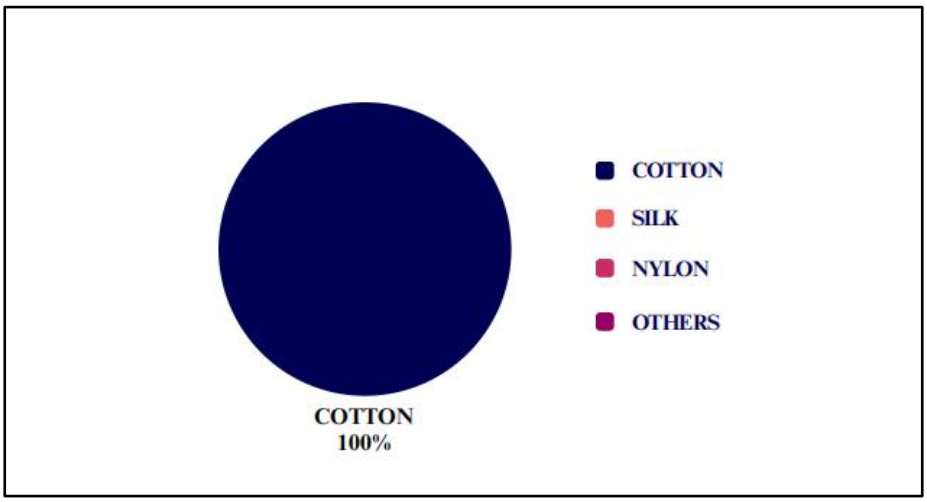
## 4.2 DATA ANALYSIS

Some data was collected via questionnaires distributed directly to parents and through interaction with them in person. Additionally, some questionnaires were given to class teachers to distribute to parents. Following completion, the researcher collected the questionnaires from the schools and entered the data into Excel sheets categorized by various aspects in the questionnaire. Afterwards, the researcher analyzed the data and developed a design of a product based on parental preferences.

The researcher analyzed the data obtained from the completed questionnaires collected from special schools, and the findings are shown in the following pie charts

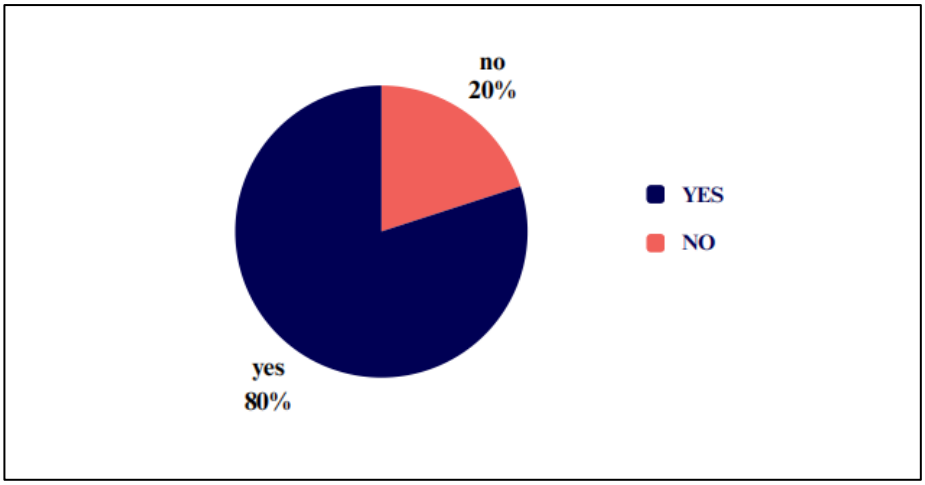



Graph 1- Fabric used in casual wear

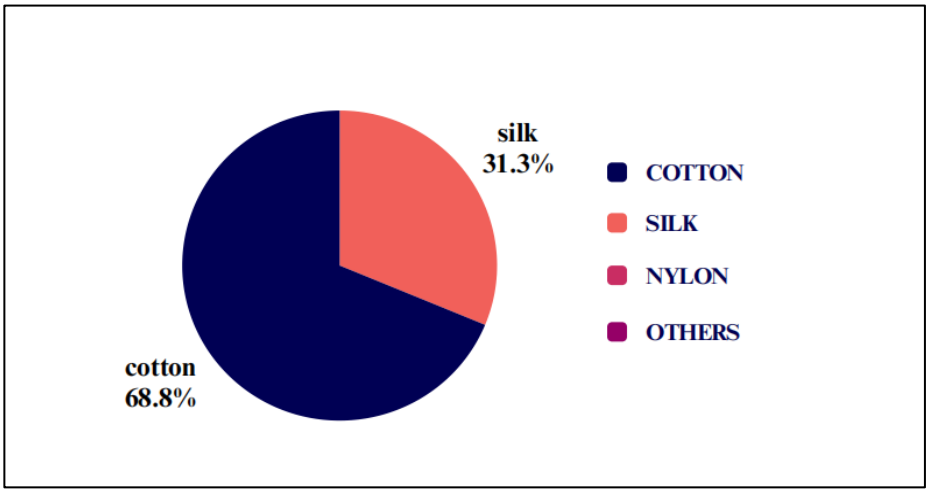



Graph 2 - fabric preference for casual wear

The major portion of the respondents, use and prefer 100% cotton fabric for casual wear, none of them use or prefer silk, nylon or others.

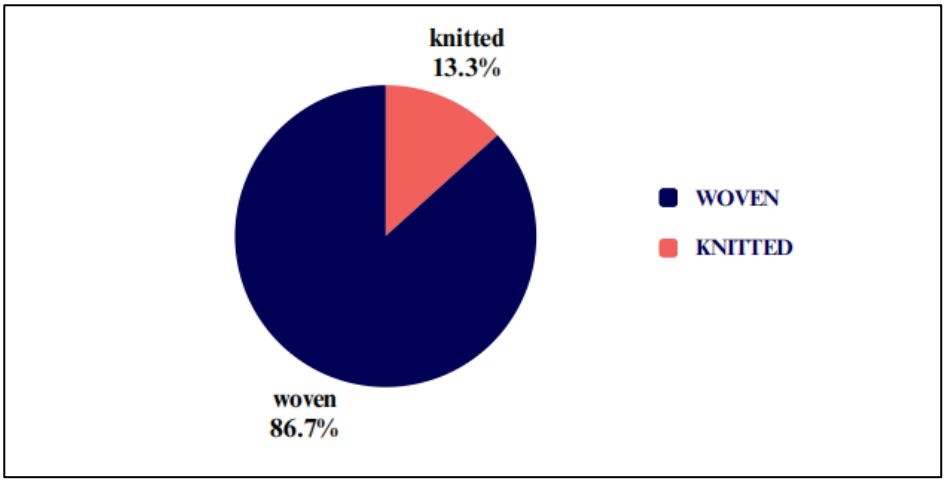



Graph 3 - taken out for social gatherings

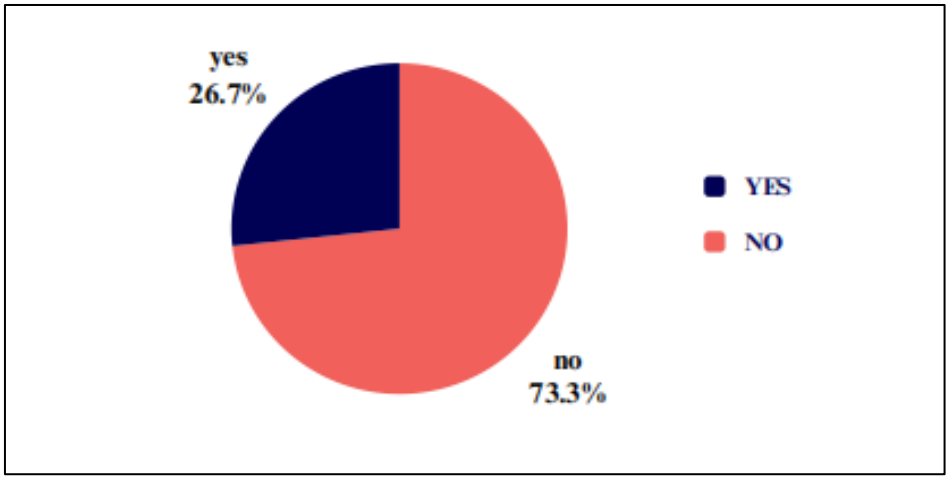



Graph 4 - Fabric preference for party wear

In the case of taking children for social gatherings 80% responded positively. 68.8% prefer cotton and 31.3% prefer of silk for party wear.

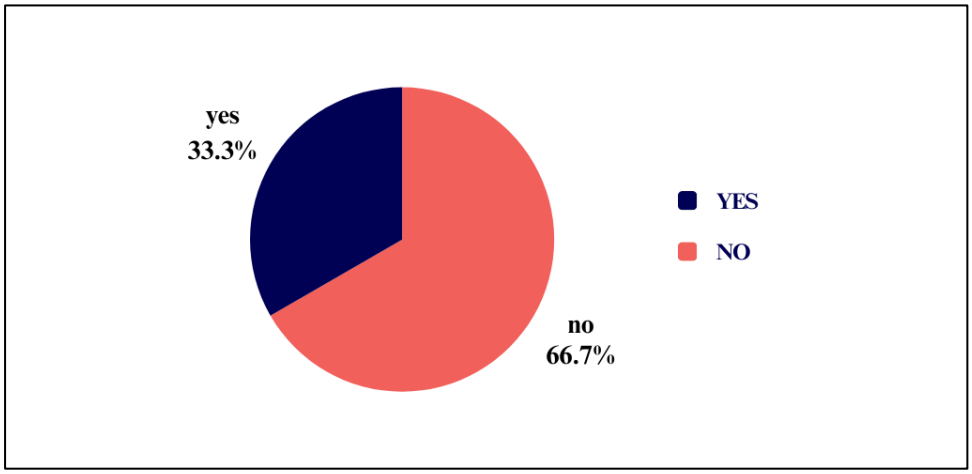



Graph 5 - construction preference

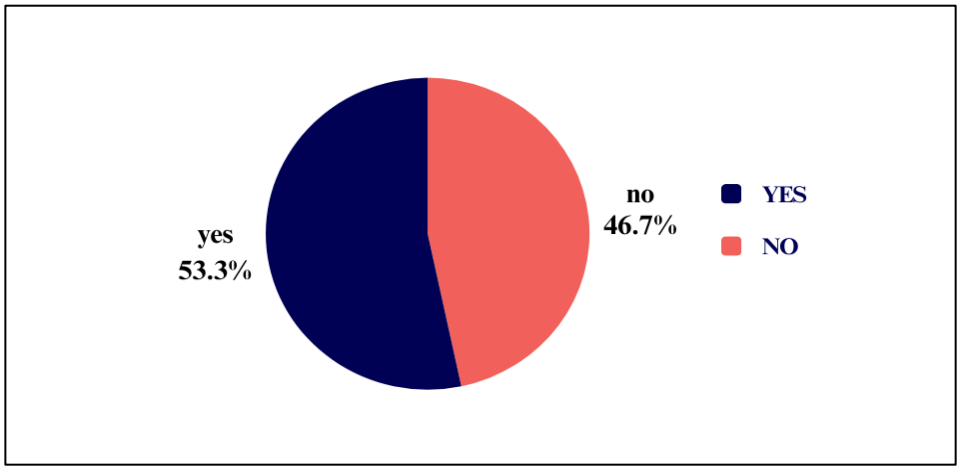



Graph 6 - wearing preference

Based on the survey 86.7 % prefer woven fabric for their child and 13.3 % prefer knitted fabric, 73.3 % of them don't have any likes/tastes about garments what they wear but 26.7% have likes/tastes about garments what they wear.

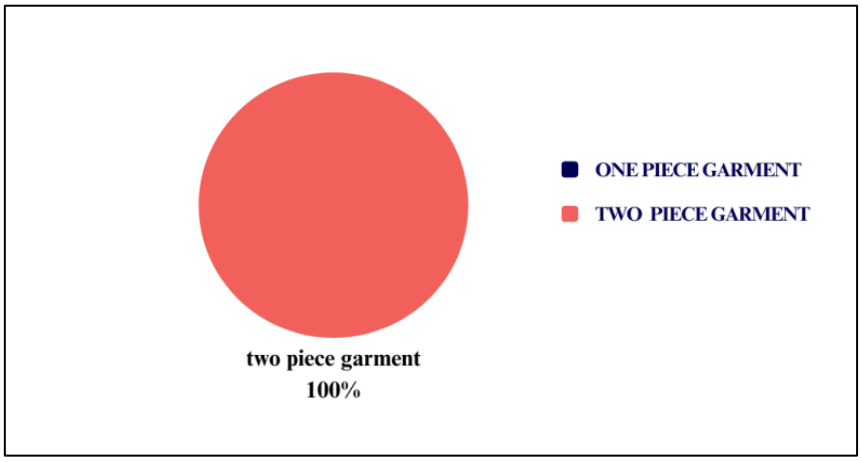



Graph 7 - colour preference

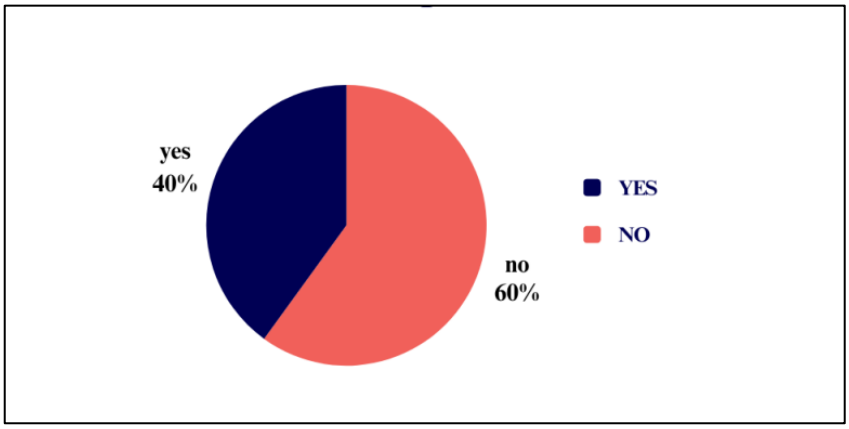



Graph 8 - party wear preference on special occasions

According to the survey, 66.7% have no specific color choice but 33.3% prefer light colors and in case of special occasion 53.3 % prefer party wear but 46.7% don't prefer party wear.

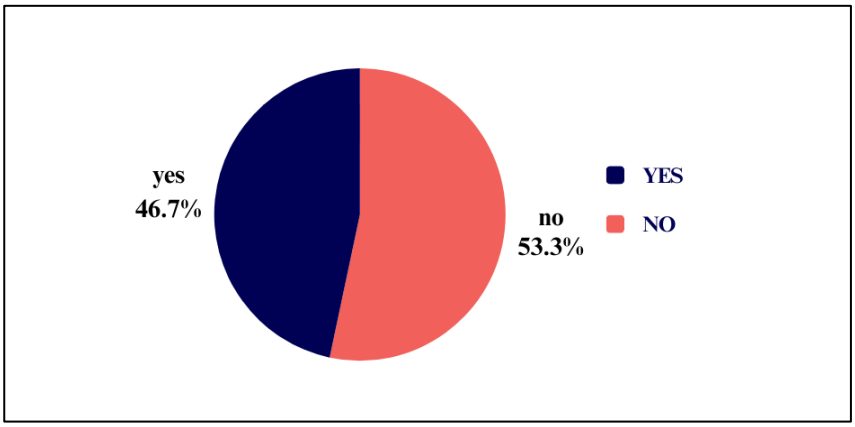



Graph 9 - garment preference

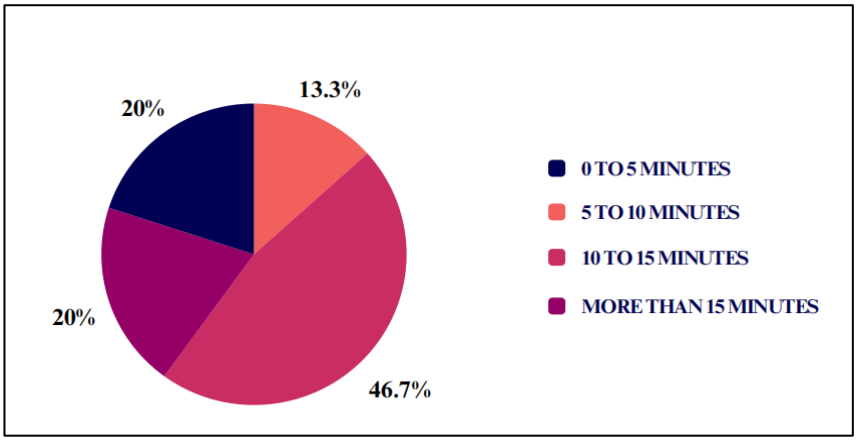



Graph 10 - sleeve preference

Major portion of respondents prefer two-piece garments that is 100% and in sleeve preference 60% responded negatively.

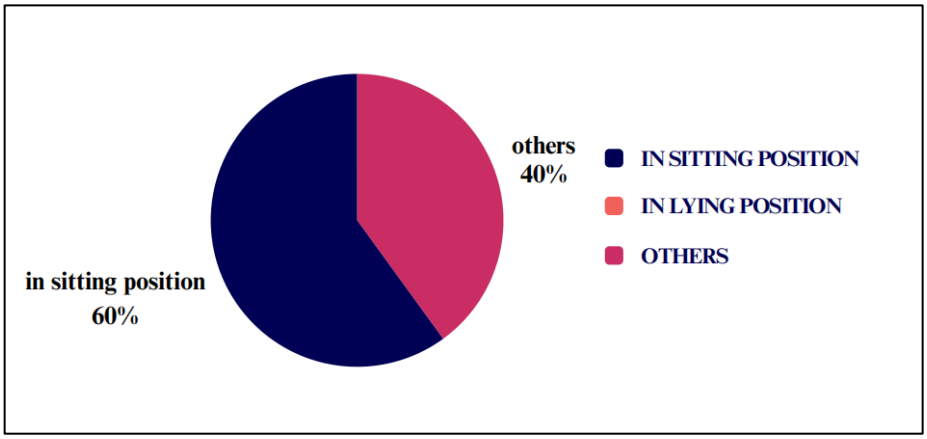



Graph 11 - dressing capability

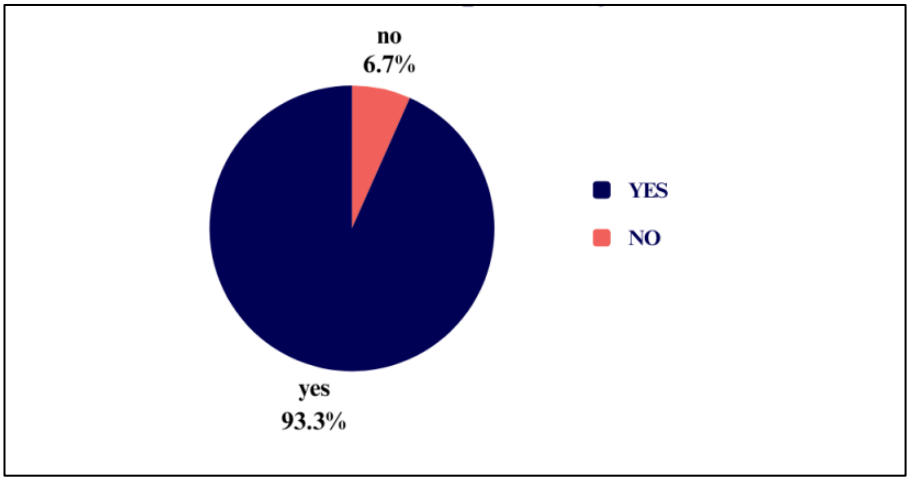



Graph 12 - time taken to dressup themselves

Based on survey 53.3% of children are not capable of dressing themselves and 46.7% are capable for dressing themselves. And 46.7% that is most of them take 10-15 minutes, 20% of them take more than 15 minutes.

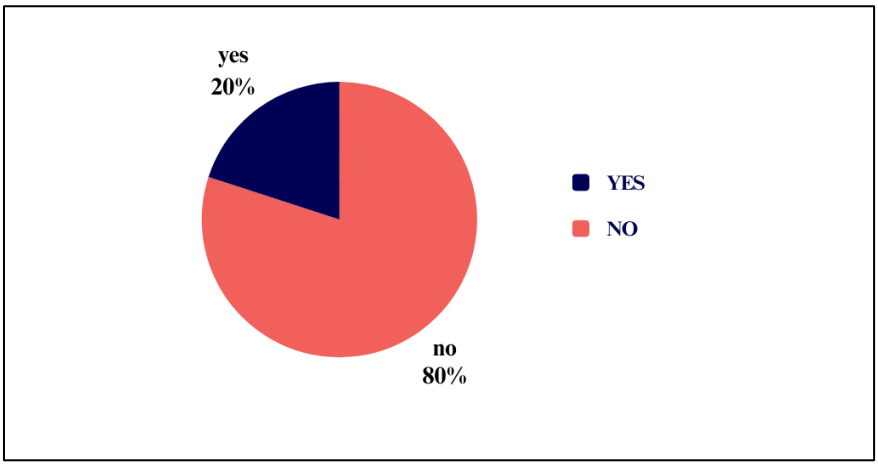



Graph 13 - dressing position

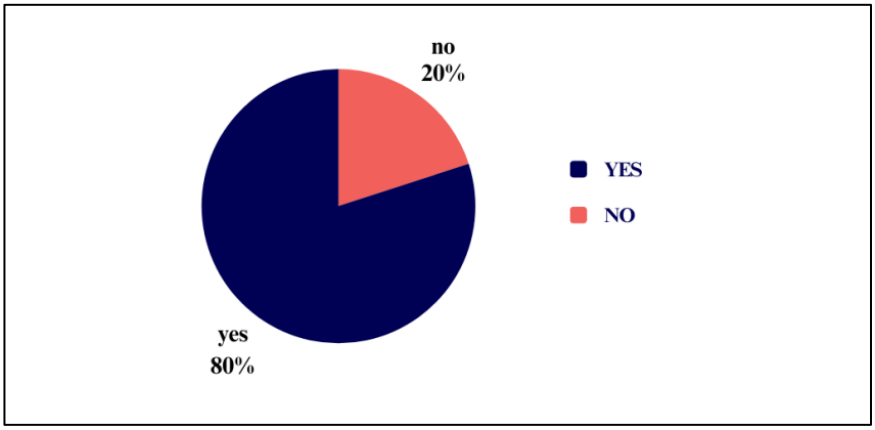



Graph 14 - movement possibility

According to the survey, 60% of them prefer to change clothes in a sitting position and 93.3% of children are capable to move their extremities themselves.

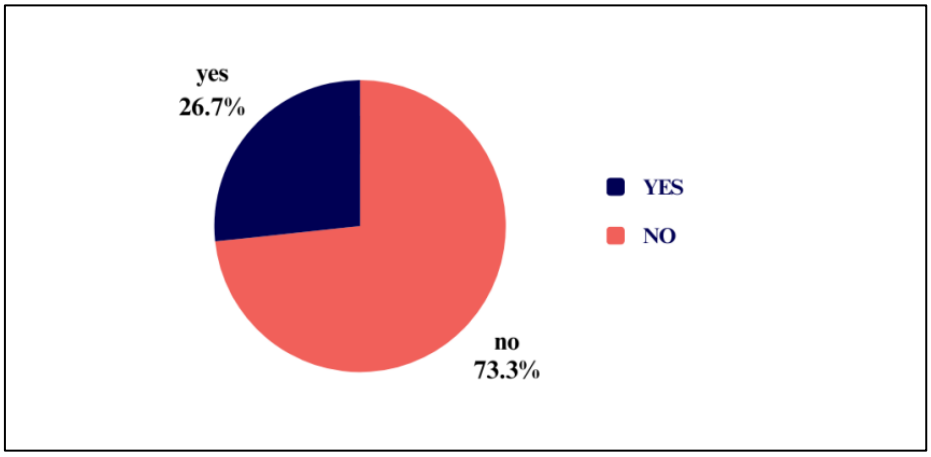



Graph 15 - use of assistive device

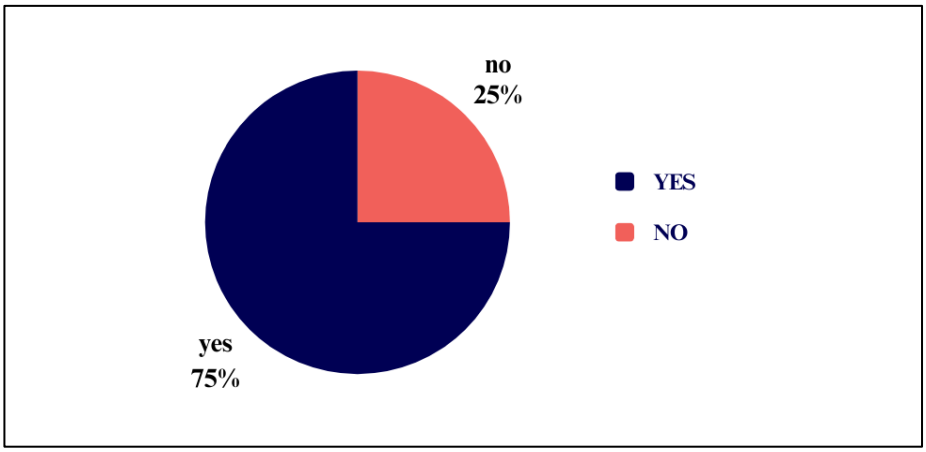



Graph 16 - comfortability

In case of assistive device usage 80% don't use such device but 20% use assistive device and about comfortability 80% of them are comfortable with any kind of dresses.

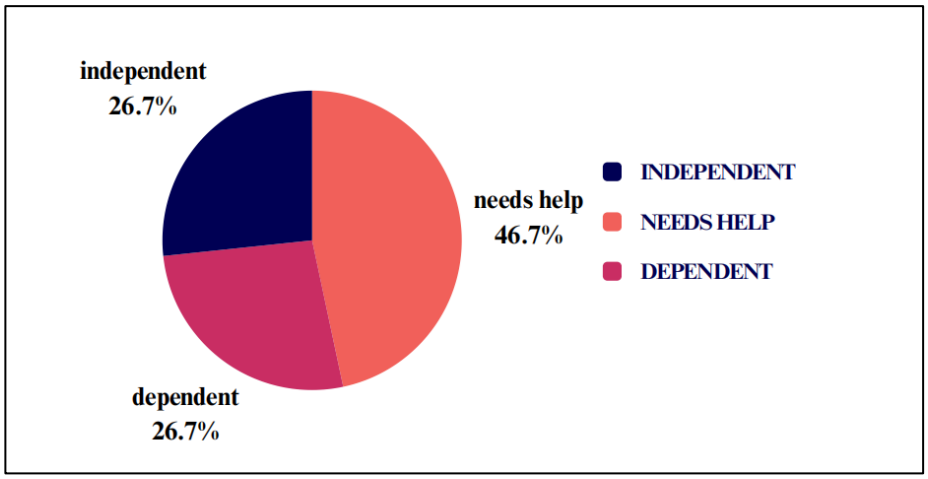



Graph 17 - drooling

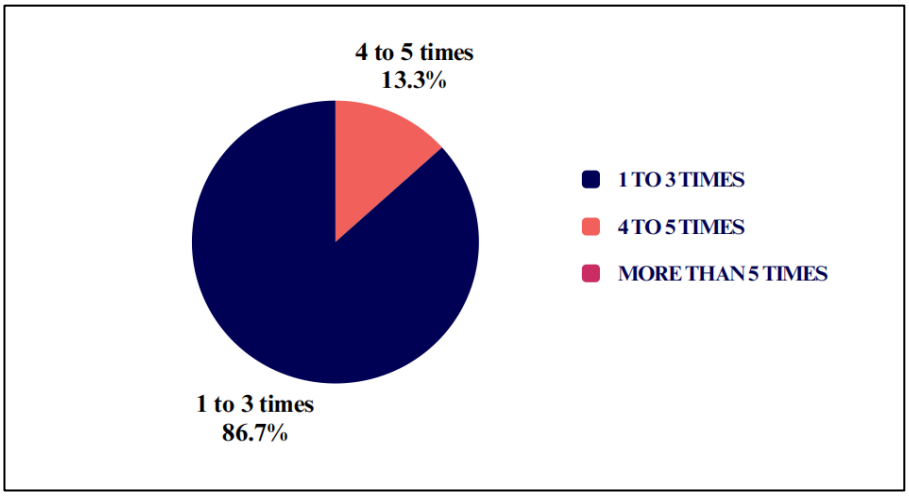



Graph 18- wiping possibility

Based on survey 73.3 % of children don't drool but 26.7% drool and those who drool in that case 75% of them can wipe themselves.

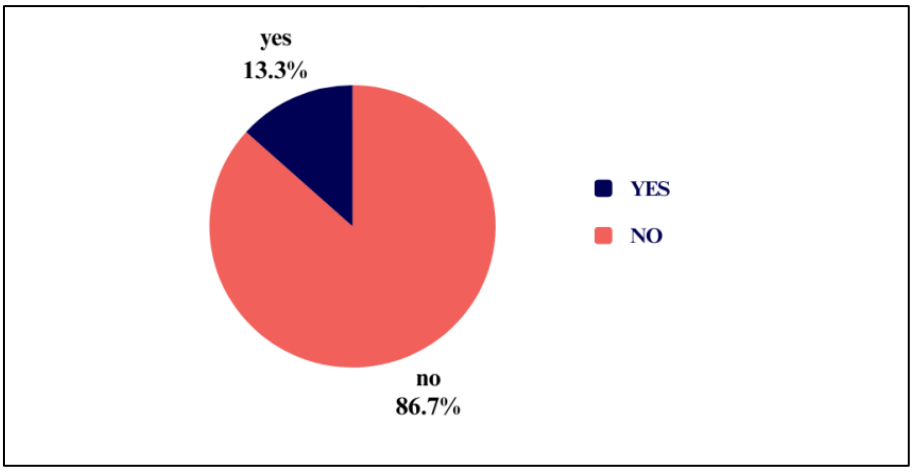



Graph 19 - degree of dependency

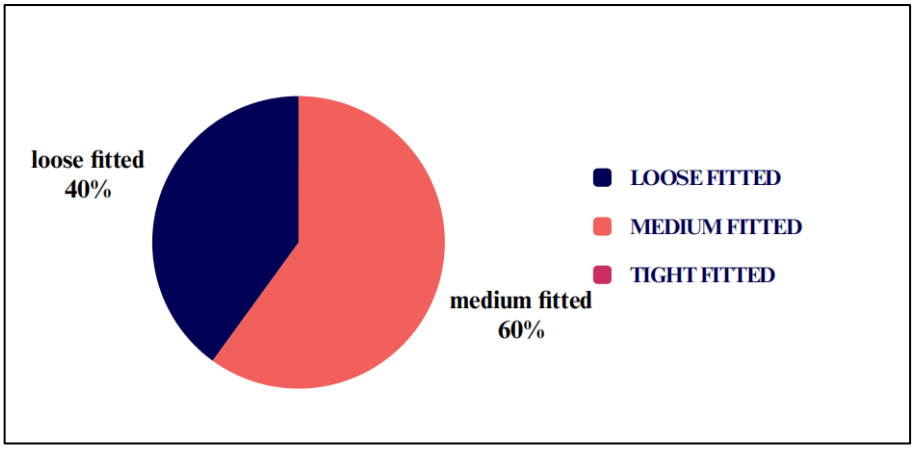



Graph 20 - frequency of changing clothes

According to survey most children that is 46.7 % of them need help to change clothes,26.7% are dependent and another 26.7% are independent. Most children i.e. 86.7 % of them change clothes 1 to 3 times a day and some children 13.3% change 4 to 5 times.

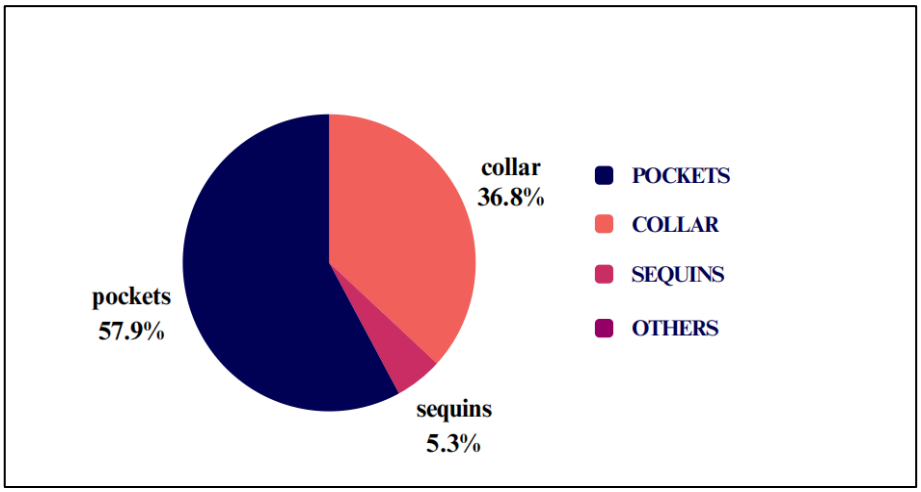



Graph 21 - nightwear usage

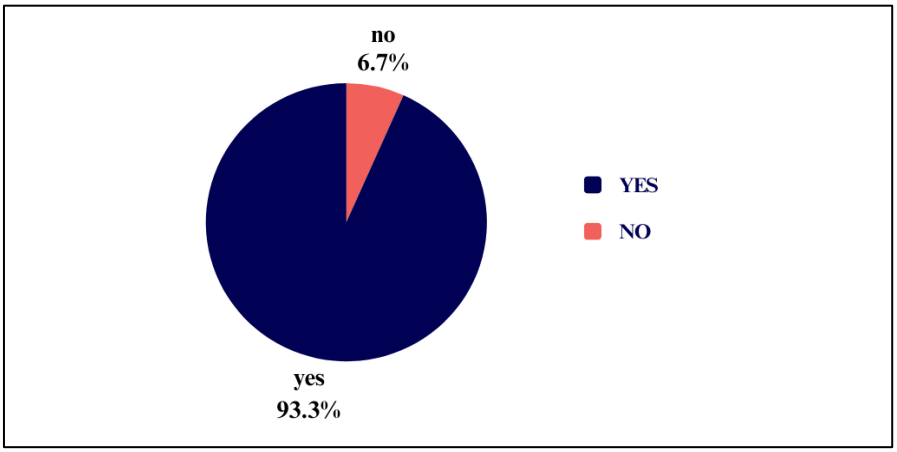



Graph 22 - fitting preference

Based on the survey 86.7% of them don't use separate night wears and in the case of fitting 60% of them use medium-fitted garment and the other 40% use loose fitted garments.

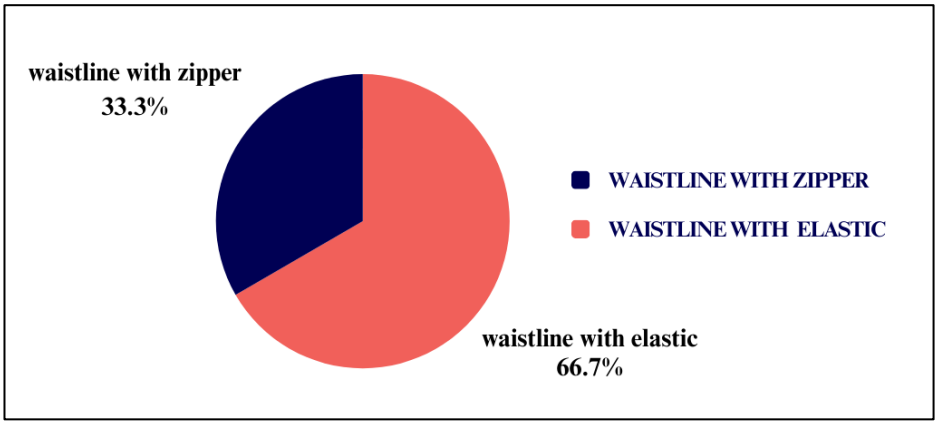



Graph 23 - comfortable with fasteners

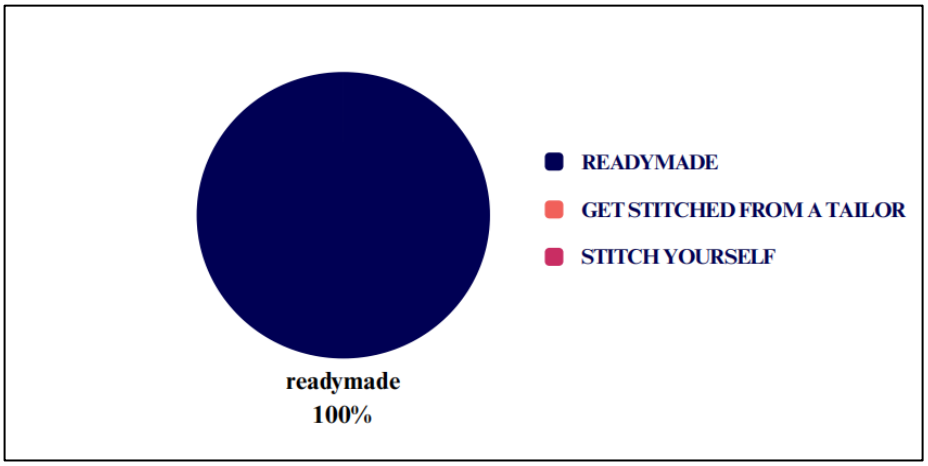



Graph 24 - design preference

In case of fasteners, 57.9 % are comfortable with pockets, 36.8% are comfortable with collars and 5.3% are comfortable using sequins. 93.3 % of them are comfortable with fasteners.

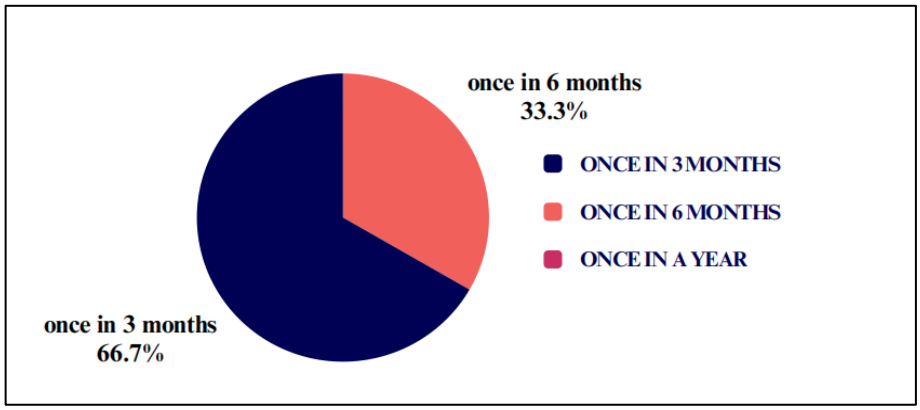



Graph 25 - waistline preference

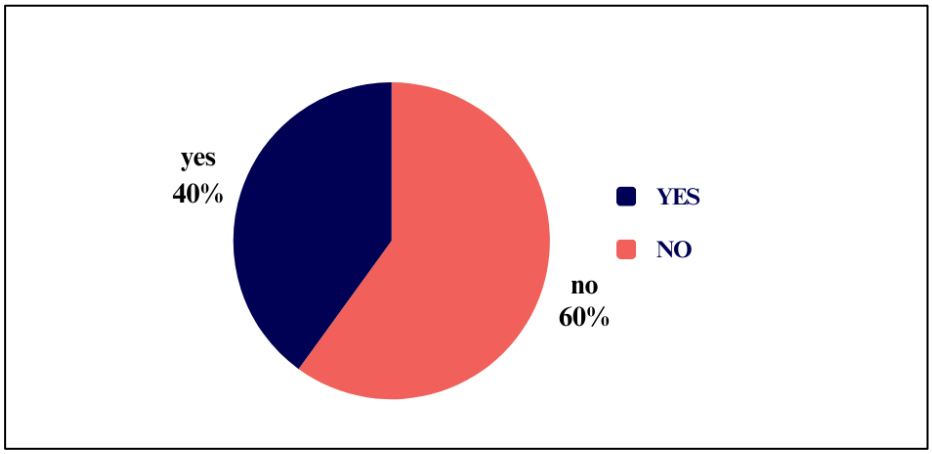



Graph 26 - garment preference

According to a survey most of the children (66.7%) prefer a waistline with elastic and. 100% of respondents prefer readymade garments.

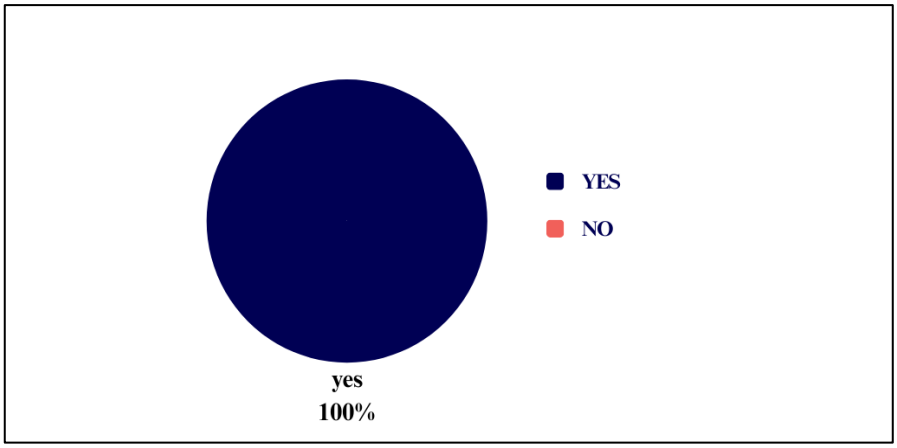



Graph 27 - frequency of purchasing clothes

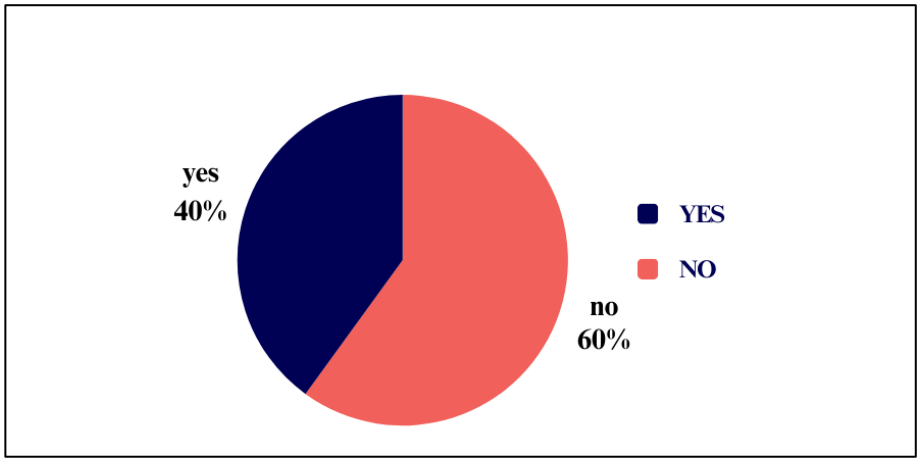



Graph 28 - alteration

In case of purchasing fabric most parents (66.7%) purchase once in 3 months and other 33.3% choose once in 6 months. Most parents (60%) don't do any alterations.




Graph 29 - adaptive clothing




Graph 30 - interested in learning to sew adaptive clothing

Based on survey 60% of respondents are not interested in learning to sew adaptive clothing but 40% of respondents are interested.

According to survey, hyperactivity, uneasiness, hand and leg stiffness condition, size issues and repeated instructions are the problems faced by parents while dressing their child. Difficult to identify button holes, unbuttoning the garment, wearing difficulties and coordination issues are the main problems faced by the child.

## 4.3 DESIGN DEVELOPMENT

After analyzing the data, seven designs each were developed as adaptive uniforms for girls and boys with cerebral palsy. A total of fourteen designs are drawn using Adobe Illustrator and are shown below: -

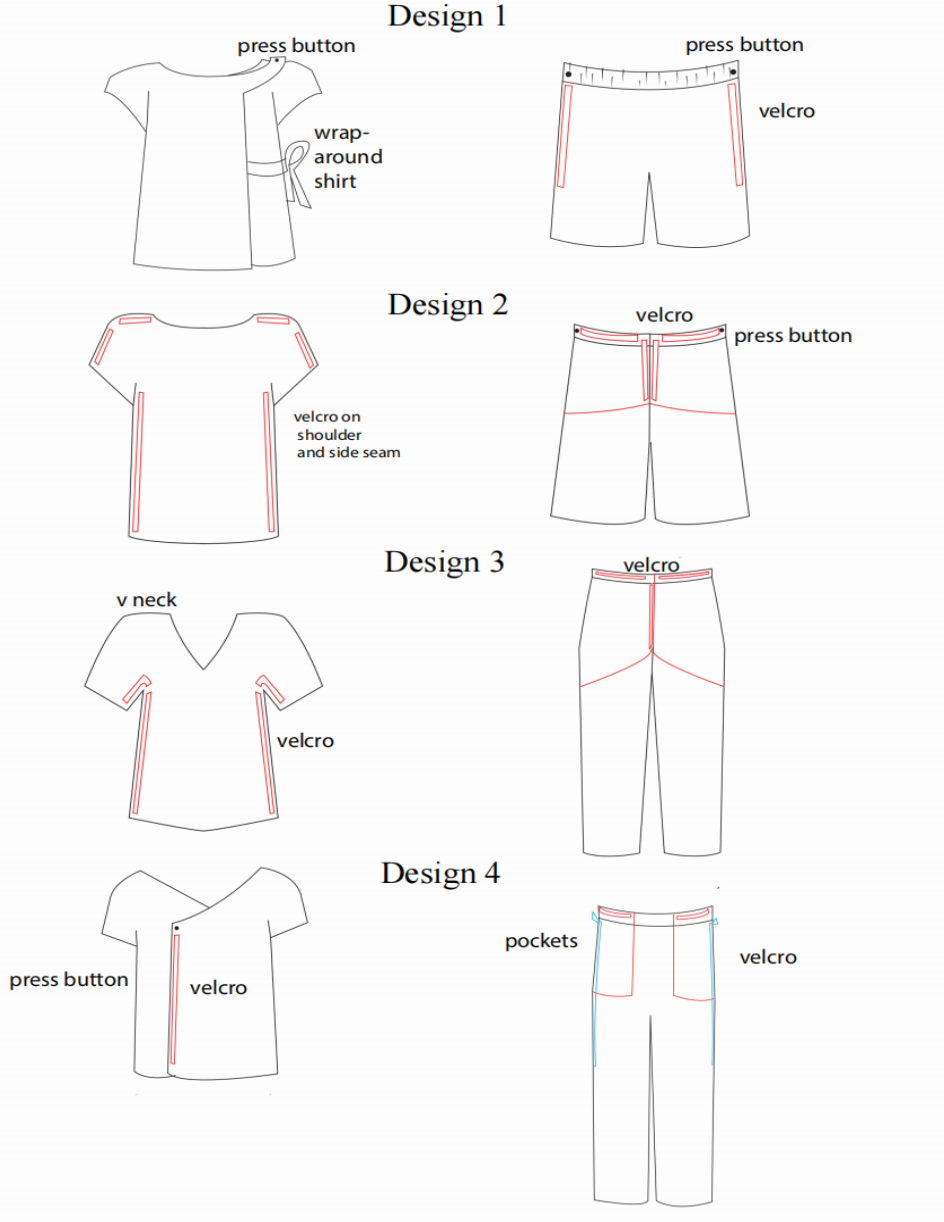



FIGURE 1 – ADAPTIVE UNIFORM WEAR DESIGNS FOR BOY CHILD WITH CEREBRAL PALSY

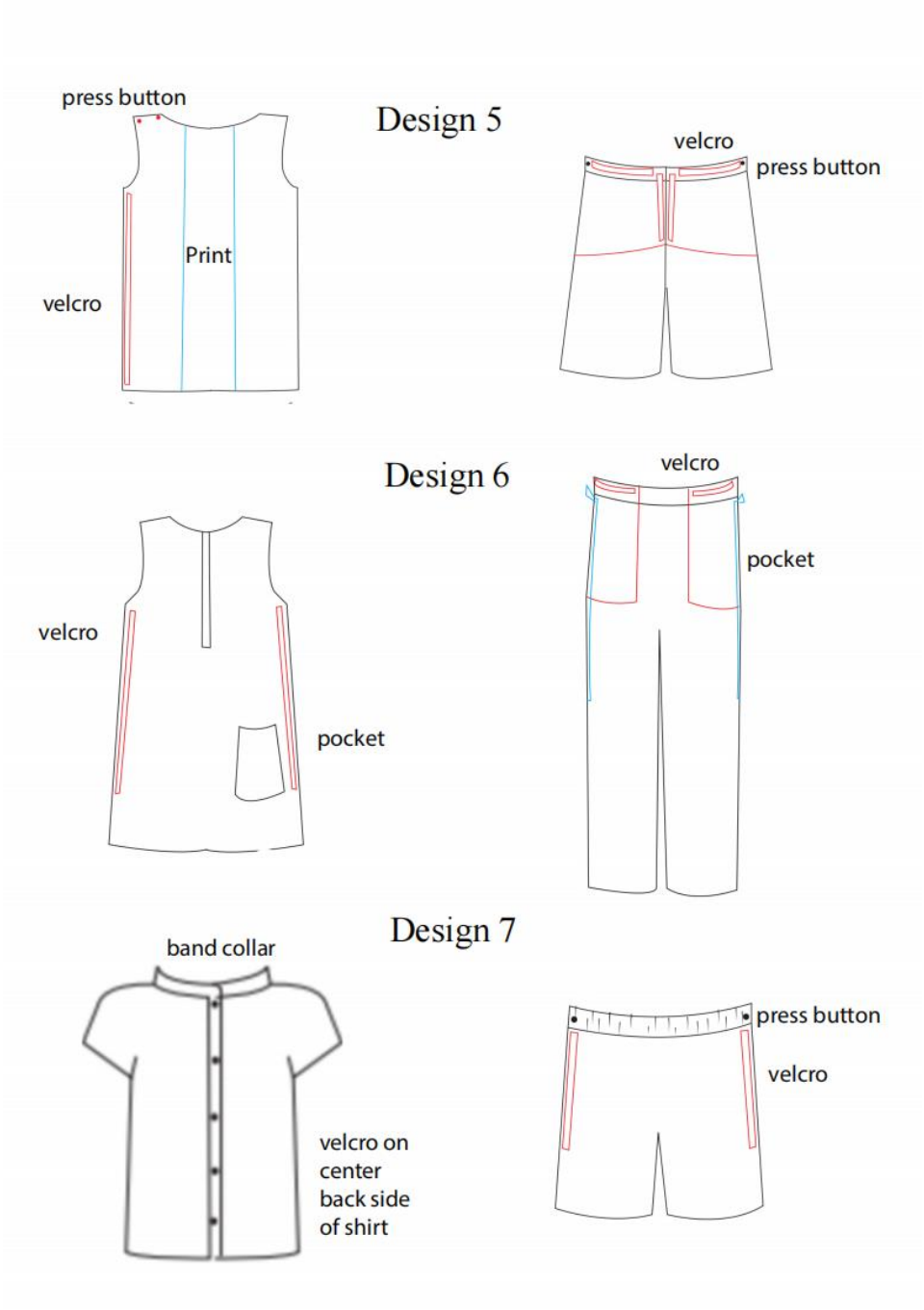



FIGURE 2 -ADAPTIVE UNIFORM WEAR DESIGNS FOR BOY CHILD WITH CEREBRAL PALSY

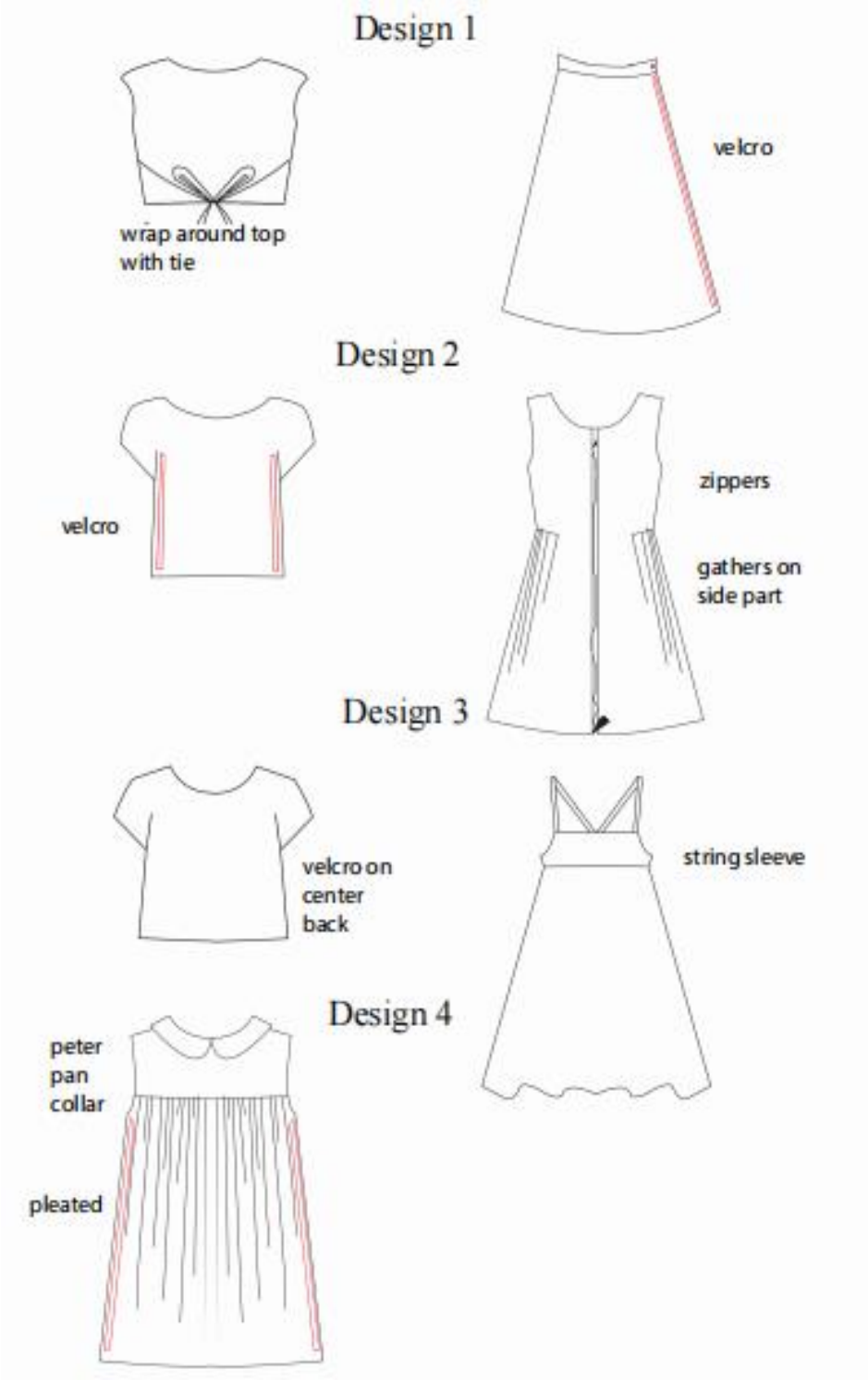



FIGURE 3 - ADAPTIVE UNIFORM WEAR DESIGNS FOR GIRL CHILD WITH CEREBRAL PALSY

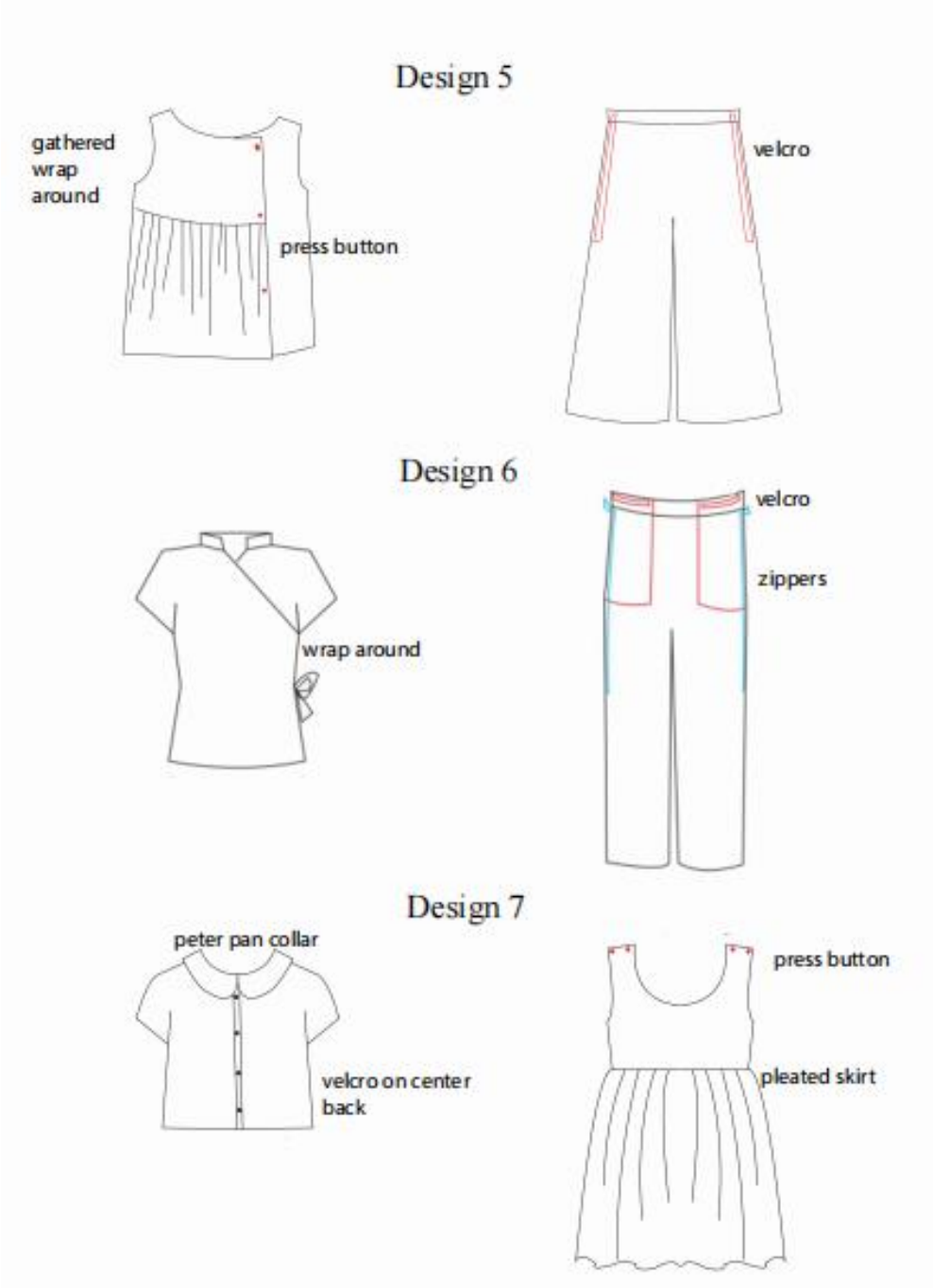



FIGURE 4 - ADAPTIVE UNIFORM WEAR DESIGNS FOR GIRL CHILD WITH CEREBRAL PALSY

## 4.4 DESIGN EVALUATION AND SELECTING THE FINAL PRODUCT

Designs were created with a focus on addressing the clothing challenges and obstacles faced by children with cerebral palsy. The designs underwent evaluation by both the researcher and the research guide. Following assessment, two final designs were chosen: one adaptive uniform for a girl and another for a boy aged between 9-10 years.

The selected designs are given below:

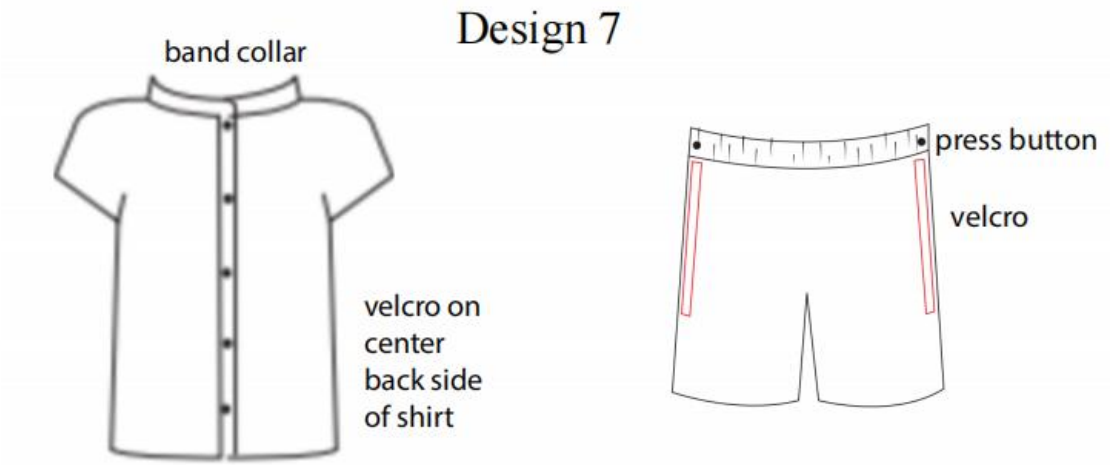



FIGURE 5 - SELECTED ADAPTIVE UNIFORM WEAR DESIGN FOR BOY CHILD WITH CEREBRAL PALSY

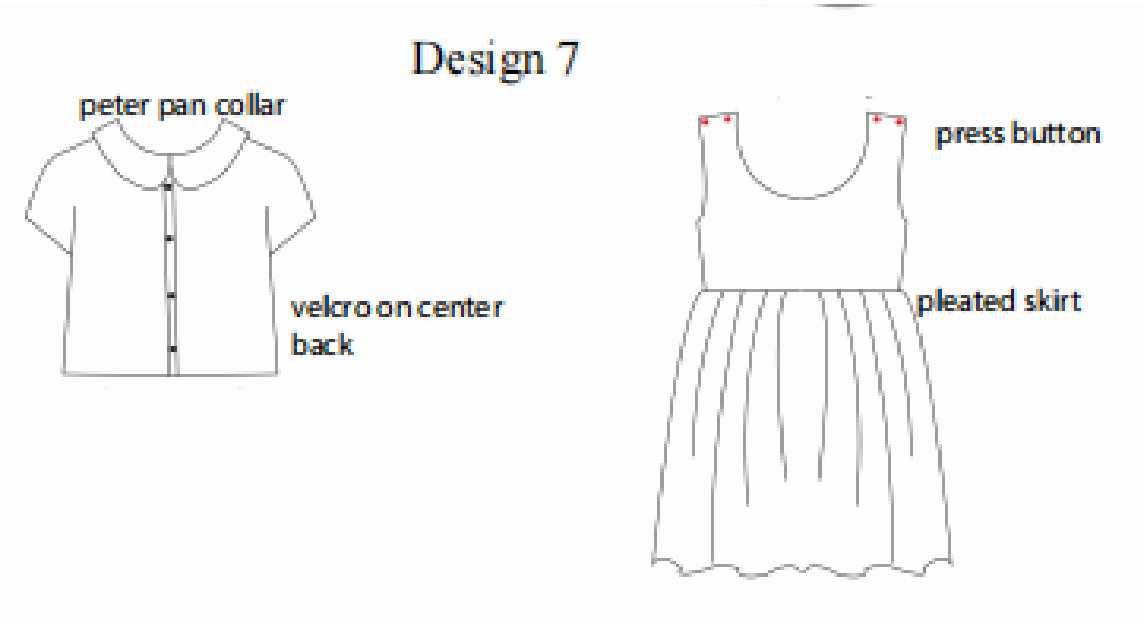



FIGURE 6 - SELECTED ADAPTIVE UNIFORM WEAR DESIGN FOR GIRL CHILD WITH CEREBRAL PALSY

## 4.5 PRODUCT DEVELOPMENT

Developed patterns manually according to the selected designs. Purchased cotton fabric and suitable trims and developed the following product.

PLATE 5 : FINAL PRODUCT (adaptive uniform wear for boy child)

PLATE 6 : FINAL PRODUCT (adaptive uniform wear for girl child)

# SUMMARY AND CONCLUSION

SUMMARY

Cerebral palsy (CP) consist of a range of conditions affecting an individual's capacity for movement, balance, and posture. This condition stems from impairments or irregularities in the developing brain, either happening earlier to, during, or shortly following birth. Such damage can affect various brain regions, such as the cerebrum, cerebellum, and basal ganglia, signifiant for regulating movement and coordination.

symptoms like muscle stiffness, involuntary movements, tremors motor skill issues, difficulties in maintaining balance, coordination, speech and language are mainly seen in individuals affected with cerebral palsy. moreover, cp may affect health issues like vision and hearing imapirments,seizures and disturbances.

**OBJECTIVE OF THE STUDY**

The objective of the study is:
To study clothing difficulties faced by children having cerebral palsy.
• To survey to understand the clothing problems and preferences of
children with cerebral palsy.
• To analyze the data and design appropriate adaptive uniforms for children with cerebral palsy.
• To construct an adaptive uniform each for a girl and a boy affected with cerebral palsy.

The samples selected for the present study were the children with cerebral palsy from special schools in Ernakulam - Mridula Sparsham Special School, Thrippunithura, Ernakulam, Amritha Institute for Differently Abled Thoppumpady, Ernakulam. The selected age group is from 5 years to 15 years. A questionnaire was developed to understand about the clothing problems faced by cerebral palsy children. The questionnaire was then given to the parents and by interacting with the parents the researcher got to know about their child's clothing issues, mobility issues, sensory processing issues and so on.

Based on the survey two products were selected to be designed and constructed. The two products were an adaptive uniform for a boy with cerebral palsy and an adaptive uniform for a girl with cerebral palsy with an age group of 9-10 years. Fourteen sketches

were developed for the above-mentioned products. The designs were drawn using Adobe illustrator. Products were designed in consideration with their problems like hyperactivity, uneasiness, hand and leg stiffness condition, size issues. Paper patterns of the selected designs were developed using by flat pattern-making method. The designs were cut on cotton fabrics which is purchased from the market.

As per the information collected from the survey it was found that cotton is the most preferred fabric by the parents and the mostly preferred fasteners are Velcro, press button, zippers. The selected designs were Adaptive uniform for a cerebral palsy boy and an Adaptive uniform for a cerebral palsy girl.

PLATE 7 : FINAL PRODUCT

## CONCLUSION

The development of adaptive school uniforms for children with cerebral palsy is a significant area of research and design aimed at addressing the specific challenges faced by both children and parents. Mobility, coordination, sensory processing issues are major difficulties faced by children with cerebral palsy, which can make traditional clothing challenging to wear. This research is an attempt to develop uniforms for children affected with cerebral palsy, thereby resolving their current problem while wearing garments, and is a preferable solution for children who face problems like hyperactivity, uneasiness, hand and leg stiffness conditions, size issues by collecting information using questionnaires through special schools and applying solution on the garment in consideration of their problems and difficulties.

Adaptive uniforms provide more comfort to the user and this thesis study has developed uniforms for children with cerebral palsy as an applicable solution which can reduce their current problems to an extent. The ultimate goal is to promote adaptive clothing, thereby considering their issues and can live a comfortable and satisfying life.

# BIBLIOGRAPHY

1. (Stanton, Marion.(2012). ‘chapter 1 an introduction to cerebral palsy’. Jessica

Kingsley Publishers, UK.)

2.(Pakula, A. T., Braun, K. V. N., & Yeargin-Allsopp, M. (2009). Cerebral palsy: classification and epidemiology. *Physical Medicine and Rehabilitation Clinics*, *20*(3), 425-426.)

3.(Soomro, N., Kamran, B., Bibi, R., & Ahmed, S. I. (2011). Recognizing the sensory abilities in cerebral palsy children. *Journal of the Dow University of Health Sciences (JDUHS)*, *5*(2), 60-61.)

4.(Ayachit, S., & Thakur, M. (2017). Functional clothing for the differently abled. *Indian Journal of Public Health*, *8*(4),

5. Krigger, K. W. (2006). Cerebral palsy: an overview. *American family physician*, *73*(1), 91-100.

6. Bax, M., Goldstein, M., Rosenbaum, P., Leviton, A., Paneth, N., Dan, B., ... & Damiano, D. (2005). Proposed definition and classification of cerebral palsy, April 2005. *Developmental medicine and child neurology*, *47*(8), 571-576.

7. Vitrikas, K., Dalton, H., & Breish, D. (2020). Cerebral palsy: an overview. *American family physician*, *101*(4), 213-220.\

8. Putri, V. U. G., Saidi, A. I., Damajanti, I., & Kahdar, K. (2023). ADAPTIVE CLOTHING DESIGN CONCEPT TO FACILITATE THE ACTIVITIES OF PEOPLE WITH CEREBRAL PALSY DISABILITIES. *Pakistan Heart Journal*, *56*(3), 555-562.

9. Kosinski, K. A. (2019). *Design for inclusivity: identifying and overcoming the design and social barriers to adaptive clothing*. University of Delaware.

10. Nakić, M., & Bogović, S. (2019). Computational Design of Functional Clothing for Disabled People. *Tekstilec*, *62*(1).

# APPENDIX

## QUESTIONNAIRE TO ELICIT INFORMATION ON THE CLOTHING DIFFICULTIES OF THE CHILDREN WITH CEREBRAL PALSY

**GENERAL INFORMATION: -**

Name of parent/caretaker: -

Age: -

Gender: -

Educational Status: -

Occupation: -

Financial Status: - (Low/middle/ High income)

Annual Income: -

Type of family: - (Nuclear/Joint)

Your relation with the child/dependent: -

Address: -

Contact Number: -

Name of the child/dependent: -

Age: -

Gender: -

Number of siblings: - ☐ Male - …… numbers ☐ Female - …… numbers

Physical condition of the child: - ☐ Mobile ☐ Partially bedridden ☐ Bedridden

Cause of handicap: - ☐ Congenital ☐ Disease ☐ Accident

Degree of disability: - ☐ Mild ☐ Moderate ☐ Severe

Degree of dependency: ☐ Independent ☐ Needs help ☐ Dependent

Does the child go to school? - ☐ Yes ☐ No

If no, why: -

If yes, address of the school: -

Contact Number: -

## QUESTIONNAIRE TO ELICIT INFORMATION ON THE CLOTHING DIFFICULTIES OF THE CHILDREN WITH CEREBRAL PALSY

**Dear Respondents please choose only one answer for multiple choice questions**

1.Which type of fabric do you use for your child's casual wear?

☐ Cotton ☐ Silk

☐ Nylon ☐ Others (specify …….)

2.Which type of fabric do you prefer for your child's casual wear?

☐ Cotton ☐ Silk

☐ Nylon ☐ Others (specify …….)

3.Is the child taken out for social gatherings?

☐ Yes

☐ No

3a. If yes, which type of fabric do you prefer for your child's party wear?

☐ Cotton ☐ Silk

☐ Nylon ☐ Others (specify …….)

4.Which type of fabric construction do you prefer for your child's garment?

☐ Woven ☐ Knitted

Why? ……

5. Does the child have likes/ taste about the garment they wear?

☐ Yes (specify…….)

☐ No

6. Do they prefer any specific colour?

☐ Yes (specify… .....)

☐ No

7. Do you prefer a party wear for your child for special occasions?

- ☐ Yes (specify… .....)
- ☐ No

8. Which of the following garments is more comfortable for your kid?

- ☐ One piece garment
- ☐ Two-piece garment

9. Does the child prefer garment with sleeve?

- ☐ Yes
- ☐ No

10. Is your child able to wear his/her clothes by themselves?

- ☐ Yes
- ☐ No

11. How much time does your child take to dress themselves?

- ☐ 0 to 5 minutes
- ☐ 5 to 10 minutes
- ☐ 10 to 15 minutes

12. How do you dress your children?

- ☐ In sitting position
- ☐ In lying position
- ☐ Others (specify… ..... ……..)

13. Can they move their extremities (hands and legs) themselves?

- ☐ Yes
- ☐ No

14. Does your child use any assistive device?

☐ Yes (Specify …….)

☐ No

15. Is your child comfortable in wearing all kinds of dresses?

☐ Yes

☐ No (Specify …….)

16. Do they have drooling?

☐ Yes

☐ No

16a. If yes, are they able to wipe themselves?

☐ Yes

☐ No (need help)

17. What is the degree of dependency of your child for doing self-care activities (brushing teeth, bathing, dressing, eating, walking etc) of daily living?

☐ Independent

☐ Needs help

☐ Dependent

18. How many times do they need to change their clothes in a day?

☐ 1 to 3 times

☐ 4 to 5 times (why ……

☐ More than 5 times (why ……

19. Is there any separate garment for nightwear?

- ☐ Yes
- ☐ No

20. Which of the following garments does your child prefer in terms of fit of the garment?

- ☐ Loose fitted
- ☐ Medium fitted
- ☐ Tight fitted

21. Which of the following design details and ornamentation would you prefer in their garment?

- ☐ Pockets
- ☐ Collar
- ☐ Sequences
- ☐ Others (specify… ..... ……)

21a. Is your child comfortable with fasteners like buttons, hooks, velcro, press button?

- ☐ Yes
- ☐ No (Specify……)

22. What kind of waist line is more comfortable for your kid?

- ☐ Waistline with zipper
- ☐ Waistline with elastic

23. How do you procure the garments for your child?

☐ Readymade ☐ Get stitched from a tailor ☐ Stitch yourself

24. How frequently do you purchase clothing for your child?

☐ once in 3 months ☐ once in 6 months ☐ once in a year

25. Do you make any alterations to meet his/her clothing demands?

☐ Yes (Specify …….)

☐ No

26. What problems do you face when dressing the child?

27. What problems does the child face when wearing and during use of the garment?

28. Have you heard about adaptive clothing?

☐ Yes

☐ No

29. Are you ready to use natural dyed fabrics for your children?

☐ Yes

☐ No

30. Are you interested in learning to sew adaptive clothing for your child?

☐ Yes

☐ No

Any other suggestion or comments -