

## REVIEW OF LITERATURE

The review of literature revealed that a considerable amount of work has been done in the United States and the United Kingdom by occupational therapists and home economists in the area of clothing for the handicapped. A number of researchers, designers, occupational therapists and home economics students have studied clothes for the handicapped in relation to specific age groups, sex and disabilities. However, the author could not locate any study in India on this subject.

A project entitled "Work Simplification in the Area of Child Care for Physically Handicapped Women" began at the University of Connecticut in 1955. A review of the problems in this area revealed that easily managed ready-made clothing by the handicapped mothers for their young children were scarce. Two main tasks were: (a) to ease the situation for mothers with hand problems and (b) to promote independent dressing in young children.

Boettke surveyed retail market to find readymade garments which could be managed by the handicapped mothers for their normal children. Such garments were not available. Boettke and her staff designed garments for young children. These were then

tested by a selected group of co-operating handicapped mothers who had some hand difficulty. The recommended design features of these garments were:

- (1) 'Self-help' features - to select "Easy-on, Easy-off" garments to encourage the child to begin to dress himself and to make dressing easier for the handicapped mother.
- (2) 'Growth' features - to buy clothes with hems and tucks that can be let out easily to allow for the growth of the child and, therefore, extend the length of usefulness of the garments.
- (3) 'Comfort' features - to avoid seams that bind-straps that fall off the shoulder - clothing that interferes with activity.
- (4) 'Wear' features - to collect right size, sturdy fabrics, strong seams, suitable trimmings, and practical fasteners.
- (5) 'Easy Care' features - careful selection of fabric, design and construction.

Schwab and Sindelar (1973) found that in the early 1930's imaginative parents made simple adaptations of clothing for their handicapped children. Garments, such as dresses and nightgowns, were made to open all the way to allow for ease of dressing. The invention and growing use of the zipper aided these parents. In the early 1950's, a rating scale, entitled Activities for Daily Living, was developed for measuring

attainments in self-care; some items on dressing and undressing were included. This scale led to a new focus on the difficulties of dressing and the time involved with clothing. Follow-up studies with functional garments for both boys and girls were conducted at the Eastern New York Orthopedic Hospital-School in Schenectady, New York and at the Institute of Rehabilitation Medicine (IRM) in New York city. The studies emphasized a simplicity of fashion which accented the idea of as few garments in the wardrobe as possible and a minimum of fastenings in each garment.

Hallenback in 1966 stated that occupational therapists have been of necessity interested in the clothing problems of the handicapped for many years and much of the early work with children can be attributed to Cardwell (1947), Dillingham (1948) and Brumyate (1949). By the early 1950's, provocative questions were raised by professional personnel working with cerebral palsied children in New York State regarding the practicality of the clothing available to the children. Brown (1951) and others designed children's clothing to meet some of the needs.

Boettke continued her interest in self-help garments for children and found that many features she used for the earlier study conducted in 1955 for the normal children could be adapted for the clothing of handicapped children and solve the problem

for their struggle for dressing. Therefore the home economic staff of the University and the Connecticut Society for Crippled Children and Adults in research with children undertook another study (1963). It determined some of the problems and possible solutions to the clothing problems of physically handicapped children from three to sixteen years of age. The information was based on 46 boys and 47 girls with physical handicaps.

The parents were questioned on the amount of help their children needed with the activities of daily living. Dressing was the activity which was checked most frequently with 89 percent of the children needing help ranging from complete help to occasional help.

The parents were given a list of clothing items to check to determine for which garments children needed the most help; also to determine what kind of assistance they needed. The items that seemed most difficult to put on and take off were shoes and socks, slacks, shorts and overalls, underwear, pajamas, swimsuits, mittens and gloves, jackets and coats.

Opening and fastenings relate to problems in dressing. The children seemed to find it easier to put garments on over their heads or slip into ones that opened completely down the front than those which opened down the back or the side. A greater percentage was able to manipulate zippers, buttons and belts.

Ties were the most difficult fasteners. Grippers seemed to waiver in between. A high percentage of families were not acquainted with velcro. Ninety one percent of the children used one or more assistive devices. Leg braces were used most frequently and seemed to be most closely related to dressing problems. The assistive devices mentioned most frequently were: leg braces, crutches, wheel chairs, special lift on shoes, glasses and body braces.

Fifty percent of the mothers said assistive devices wore out clothing with braces apparently causing the greatest damage.

Crutches were reported to wear out garments in the underarm area and around the cuffs of sleeves. A few mothers said full skirts got caught in the wheels of wheel-chairs and long sleeves were readily soiled on the wheels. Several mothers mentioned that there was considerable wear due to the child's crawling, a means of moving around. This did not have any relationship to the age of the child.

When the mothers were asked if they did anything in particular to prevent or lessen damage to clothing, forty one percent answered 'Yes', they reinforced areas of clothing which wear out or made other adjustments.

Mothers who were not satisfied with styles which they bought, said that they did not give added room for movement or

make dressing easier for the child or disguise or cover abnormality.

Twenty one percent of the mothers reported that their children needed special kinds of clothing. The item mentioned most frequently was protective pants or diapers.

Only 15 percent of the mothers said that they (or someone else) made garments for their children. The garments they made most were night clothes, shirts or blouses, slacks, dresses, skirts, and underwear. There was some indication of pattern change.

Hall and Vigons (1964) studied and explained clothing adaptations for children with muscular dystrophy after three years of evaluation of activities of daily living and study of clothing problems of twenty five selected boys with childhood type muscular dystrophy.

They suggested clothing adaptations to solve the problems which arise in dressing when long leg braces were worn by a child with severe muscles weakness of the pelvic and shoulder girdles.

They reported practical solutions for common clothing problems mainly for boys.

Trousers: must be adequate in leg width so that they slip easily over long leg braces. The modern tapered trouser styles were difficult to put on over braces. Trouser cuffs easily become untacked making the trousers too long so that serious falls may occur when the bottoms get under foot. Therefore, simple hems - no cuffs - should be used on the bottom of pants as a safety feature.

Zippers on the inside of trousers' legs and extending from knee to ankle have helped in self care since the trousers can be easily pulled over shoes and lower brace. Zippers should be fairly heavy duty type to withstand constant use. The trade marked material Velcro, is very durable and can be used in the place of zippers on the trouser leg.

Pockets in trousers are usually not functional since the patients are unable to use them because of muscle weakness. Two side-seam zippers extending from waistband to the middle thigh are suggested for toileting aids in place of side pockets. An inside half-belt is worn in the rear of the trouser waist. It unfastens at one side for ease in putting on and removing over the hips. For toileting, the sides need merely to be zipped down and the half belt holds the trousers in position so that they need not be lowered over the hips to the floor.

A zipper opening fly front with a ring or string for easier operation with weak hands is recommended. If the patient is extremely weak, Velcro can be used instead of a zipper at the fly opening since this is easier to open and close. Instead of buttons or snaps at the middle front waistline, a large hook fastener can usually be managed even by the severely disabled child.

Elastic webbing allows for weight gain and waist expansion without requiring sewing alterations. This also keeps a tuck in shirt tidy if the patient propels a wheel chair. The waistband should have sufficient belt loops for the child to wear a strong leather belt. Muscular dystrophy patients with severe weakness of pelvic girdle muscles are generally brought to a standing position by lifting the child using his belt. Denim or jean cloth can be used if braces have been prescribed. Brace wearers should have the inside seams of trousers finished with expert workmanship since fraying interferes with the latches and braces. Materials for clothing should be hard finished fabrics which will not develop static electricity as this may prove a hazard. Corduroy trousers should be avoided because it is difficult to put zippers in this material. Practical colours which do not show spot or soil should be selected for clothing.

Many of these patients are overweight. Trousers that have a full seat with release pleats and a straight front with no



darts are helpful. There is then adequate room for sitting comfort in the buttocks area without excessive lap puff.

The side of the trousers in the knee area may be reinforced with Bondex hot iron fabric (jean patches) to protect the pant legs from the abrasive action caused by knee locks of braces. Use only new patches and stick well. It is best to stitch the patches for additional security.

Shirt: Mothers should purchase shirts a little larger than the actual measured size with buttons all the way down the front. They are easier to put on. If the child has a marked deformity from muscle weakness, plaids or checks conceal this more than light plain colours. It is advisable to avoid "T" shirts and overhead sport shirts because of difficulty in getting into these shirts when a patient has upper arm weakness and show elevation difficulty. Avoid shirt tails as they are difficult for weak patients to manage independently and because they look untidy if they are not tucked in properly. A shirt finished with a straight cut bottom looks well whether in place or hanging out.

A full back yoke or pleats close to the armholes provide a spread that is useful when the garment is being slipped on. A low rolling collar is helpful for patients in wheel chair as this does not ride up at the back of the neck when the wheel chair is being propelled.

Fairly large buttons should be used since they are easy to grasp. Sometimes when the patient is quite weak, it is necessary to place Velcro under the buttons on shirts. With long sleeves, Velcro should be used at wrists instead of buttons.

Underwear Top: A white "T" shirt slit completely down the middle front and made with a Velcro closure eliminates the difficult process of pulling it over the head. A shoulder opening can lend additional ease of dressing when a typical movement requires assistance. These adaptations can help to add a feeling of independence as the child touches and closes the Velcro on the garment. It is an advantage to severely disabled children that they can often be taught to remove this very personal garment without any assistance.

When stitching down the Velcro, sufficient overlap is suggested so that the Velcro is not directly in contact with the flesh.

Shorts: For most muscular dystrophy patients boxer shorts are easier to put on than briefs. However, for patients in the early stages of the disease with milder weakness the new Ban-Lon briefs are quite satisfactory. It is well to remember that to maintain the special qualities of softness and stretch, Ban-Lons, do require special consideration and care in the laundry.

An added feature in the boxer type which aids in toileting as a rear drop-seat opening which completely eliminates removing any clothing for toileting, since it coordinates with the side, zippers, drop-seat of the trousers. The drop-seat opens and closes with either Velcro or buttons, whichever is preferred for the patients' requirements.

Friend et al. (1973) conducted a study "Meeting the Clothing Needs of Handicapped Children". They surveyed parents of 69 physically disabled children and disclosed that 94 percent of the respondents had problems of one type or another with ready-to-wear garments. Forty-three percent of these who identified a particular type of garment as most troublesome could not suggest an improvement that would make the garment more usable.

The researchers undertook two individualized studies - one with a nine year old girl with cerebral palsy and another with a teenage girl with spina-bifida. The nine year old had many physical limitations. She did not walk or talk. The movement of her right hand was spastic and used her left hand only for bracing objects. She spent much time on the floor, usually wore pants and knit tops. Shirts that buttoned down the front had proved impractical because she pulled at her clothes when frustrated, and the strain popped off the buttons. Her mother like many others in the group surveyed did little sewing. She purchased ready-made outfits and dressed the child herself.

To help the child even in a small way the researchers decided to alter a shirt so as to make it easy to slip on and off without changing the appearance in a way that the child would find objectionable. They selected a knit shirt with a front button and then considered various fasteners as alterations to the small buttons (which the child could not possibly handle). To make sure they chose fasteners she could operate and constructed teaching boards with mockups of bodice fronts. After letting the girl experiment with each of the fasteners on the teaching boards, they selected three that interested her and proved manageable for her after a few trial periods. They altered three identical knit tops. On one replaced the button closing with a large industrial type zipper with a ring pull. On a second knit top used a wide oval loop with a gold clasp, and on a third top, a nylon tape fastener.

After the researcher, the child's mother and the child's nursery school teacher evaluated each of the innovations, it was concluded that the nylon tape fastener placed under the buttons on the shirt top was the simplest alteration to make. Also, the child liked this because appreciably relatively easy for her to operate. The girl also liked the large zipper, but it was the most difficult alteration to make and consequently was impractical for the non-sewing mother.

The teenage girl with spina-bifida presented more challenging problems than did the nine year old girl. The teenager had a congenital malformation that left her paralyzed below the abnormality on the spinal column. She could not walk without the aid of crutches and leg braces and had to wear a waste-collection bag because of incontinence. When she stood, her body bent forward from the hips. The upper part of her body, however, was extremely well developed.

The clothing problems that resulted from this combination of physical handicaps were tremendous. Her large bust and wide shoulders called for garment shaping that was normal for a matronly figure. The braces and the waste collection bag precluded a normally tapered waistline. Short skirt such as teenagers preferred to expose the derriere and the waste collection bag because of the stooped posture.

As a first step toward the solution of these problems, they determined the preferences of the girl herself regarding the collar or neckline treatment, sleeve style, and the type of garment, dress, jumper, skirt and blouse or pants suit. The clothes she had been wearing were readymade and most inadequate. They therefore, looked for commercial patterns that could be adapted to include as many desired features possible into one garment. Eventually a pant outfit that could change with relative ease was chosen.

The pattern was altered as follows: (1) the length of the top was reduced; (2) widened the bodice through the chest and across the upper back without increasing the shoulder width; (3) shortened the sleeves; (4) widened the pants waistline and, at the same time, increased the back body rise more than 5 inches and shortened the front body rise; and (5) shortened the legs.

The pattern was altered for style changes by (1) adding a stand up collar; (2) putting elastic in the sleeves at the wrists to make them less restrictive than they would be with a band; (3) inserting a zipper into a front tab closing; (4) converting the lower edge of the top to a shirt tail hem curved at the side seams to make less noticeable the four-inch difference between front and back lengths; (5) inserting elastic at the waistline of pants; and (6) shifting the zipper placket to the center front of the right pants' legs to provide an opening immediately over the waste collection bag.

White, an occupational therapist and Dallas, a clothing designer (1977) collaborated in solving clothing and dressing problems of a seven year old girl with a congenital quadruple amputee. She presented a clinical picture of bilateral, long above-elbow amputations; proximal femoral focal deficiencies bilaterally; absence of the left fibula; and plano, Valgus feet.

As associated problems include decreased skin surface for perspiration; decreased sensory input when wearing prostheses; and bilateral hip and knee flexion contractures. The child had upper extremity prostheses for several years and received training in their use specific to her need when she was developmentally ready. When she began kindergarten, dressing became more important because of her increased interaction with strangers.

The occupational therapist and the clothing designers combined talents to create garments that facilitated self and assisted dressing, and enhanced the personal and social development of the child as well. The clothing designs suggested resulted from two adaptations of a child's dress pattern and described in the following sections.

Sleeve: Adaptations were necessary because the prostheses were bulky and inflexible. A pattern with kimono sleeves set into a shortened shoulder seam was chosen. The long sleeves were a roomy Bishop style. The first design featured an elastic cuff that complicated dressing. The wrist length sleeves in the second dress were finished with a hem. This feature was attractive, dressing was easier, and it did not interfere with prosthetic use.

For this child roomy sleeves and a fairly woven fabric were sufficient.

Closures and Fasteners: Since the prostheses severely decreased sensory input for the child, manipulating back fasteners used in most patterns and garments for children of her age was virtually impossible. She could not use her lower extremities effectively to substitute for upper extremity functions except for fine motor manipulation of items within reach.

Two front opening adaptations of the pattern were tried - a three quarter length opening with a centered zipper (the teeth were left exposed to prevent catching the fabric laps in the zipper teeth), and a full-length overlap opening with Velcro dots placed under buttons. Buttons and buttonholes were used on the overlap for a functional looking trim.

The partial front opening closed by a zipper with a ring tab, allowed the child to open and close it with her prostheses, and required only minimal assistance on first trial. However, the full front mock button opening closed with Velcro dots made it easier to put on the dress. The light weight Velcro dots seemed to grip sufficiently during wear, and the child could pull them apart on the first trial.

Fit and Fabric: A loose fit and a fabric that allows air to circulate were desirable since the decreased amount of skin exposed when wearing the prostheses caused problems related to



perspiration. In addition, because the child had not been fitted with wrist flexion units, she used gross shoulder motions when using the prosthesis. Also, large-size garments were unbecoming.

The patterns were altered by adding an action pleat to the princess design seam lines front and back, and a box pleat was added to the center back seam. The action pleats in the bodice seams added ease but kept the fit firm. The waistline of the pattern was moved to come just under the arms rather than at the child's natural waist attaching the loose skirt at this location also provided air circulation. The action pleats also allowed room for extraneous movements. To preserve the pleat lines during wear and laundering, various construction techniques were tried on the two version, the top fold and the under fold of the pleats were edge-stitched. A dot of Velcro held the pleat in place at the waist seam line which could be released during dressing. In the second version a commercial trim edged the top fold of the pleat. At the waist seam line, the trim was separated from the pleat to permit a belt to slide through. The belt holds the pleat in place when worn, and allows the pleat to be expanded when dressing. The belt was pre-tied into a bow and fastened with a Velcro dot. In both versions of the adapted dress, the darts were stitched in but could be released to give more freedom of movement.

A light weight but firmly woven cotton-blend fabric was chosen because it slides smoothly over the prosthesis than many of the man-made fabrics.

Having a straight fitted bodice being preferred, it may have needed extra length in the waist and side back to prevent tearing the armhole or hiking up at a waist when reaching or bending. The yoke or waist seam line could also be elasticized by releasing the dart to add ease to the skirt then using elastic in a casing to pull in this added ease.

Skirt length: was relatively unimportant for the child's general mobility, which was limited to crawling or "scooting" on her buttocks in sitting position. In the first version, the skirt was shortened, and the hem was designed to just meet the floor when she was seated. However, a longer skirt did not interfere with the child's mobility and created a more pleasing proportion and more feminine appearance.

Scott (1959) initiated a study, "Clothing Needs of Physically Handicapped Home Makers" for the purpose of developing functional clothing for handicapped home-makers who had ambulatory handicaps.

To find out what their clothing needs were, a questionnaire was designed and used in interviewing 70 handicapped home-makers living in metropolitan Washington..

The handicaps were the results of infantile paralysis, multiple sclerosis, arthritis, muscular dystrophy, accidents, and amputation. Most of the women used some type of aid-wheel chair, crutches, braces, walker, or cane. In many instances the handicap involved shoulders, arms, and hands as well as the lower part of the body.

Ages of the homemakers ranged from 21 to 82 years. More than one-third of the women had from one to four children at home, ranging in age from 7 months to 17 years. Forty of the homemakers lived in houses, 30 in apartments. All but seven managed to do their house work with more or less help from members of their families.

Findings showed that the homemakers handicapped by infantile paralysis, multiple sclerosis, and arthritis, and using wheel chair, crutches or braces had the most difficulties.

The women preferred moderately full skirts, considered aprons essential, found armholes and backs of blouses vulnerable to strain in reaching and reported armholes and sleeves damage from using crutches. They liked the comfort of kimono sleeves, favoured short rather than long or no sleeves, and disliked high necklines (except those women having shoulder involvement). They preferred front openings on garments, favoured zippers and very much wanted 'large handy pockets'.

Brace wearers expressed most interest in slacks, which were also liked by women who were carried in and out of cars. Many women used cardigan style sweaters as indoor wraps. Scott noted that general lack of awareness among the handicapped homemakers regarding "action features" in clothing or that anything could be done about their problems of ripping, pulling out, and fabric strain. Her findings in this respect indicated the need for education of the handicapped in this specialized area.

Skirts need some fullness for ease of donning and comfortable sitting; however, too much fullness would drag on the floor when a person was sitting, would get under the tips of crutches, would interfere with the wheels of the chair. Wrap-around skirts with back lapping were liked by many homemakers for ease of donning and toileting. Two-piece outfits allowed for rise in long reaches up or outward, especially if the tails were extra-long or given an extra piece to be tucked into the skirt or slacks. Kimono sleeves were easily donned, gave considerable freedom of movement, and did not cling to moist skin as much as set in sleeves. Low collars did not ride up on the neck and wear neater looking than high collars. Bodice having pleats or other "action" features giving extra room were preferred, by women using crutches or wheel chairs.

Sindelar (1973) studied the clothing satisfactions and preferences of 46 physically limited homemakers with hand/arm

and/or leg disabilities, living in small town/rural areas of Nebraska and metropolitan areas of New York City. The Nebraska sample of 33 homemakers consisted of 2 women with hand/arm disability, 12 women with leg disability, and 19 women with both hand/arm and leg disability. The 13 women in the New York sample had both hand/arm and leg disability.

Rank order was used to indicate features preferred in readymade clothing for both a Nebraska and a New York sample.

The study indicated that approximately 50 percent were independent in their dressing. The other 50 percent expressed some degree of dependence on others in their dressing due to poorly placed closures, especially back zippers and use of fasteners and closures that were difficult to manipulate.

Sixty five percent of the women experienced difficulty with fasteners. Hooks and eyes, zippers and buttons were found to be problems. Other difficulties were caused by sleeves, necklines and set in belts or bands.

The physically limited women of the study were extremely conscious of their clothing and dressing problems and found it difficult to obtain clothes which enabled them to be independent in their dressing care.

The women had suggestions for improving clothing for the disabled and solving some of the more prevalent operational problems. They voted for zippers with large pull tabs, large buttons, large grippers and hooks. They wanted action pleats strategically located (under-arm for crutch use, knee for brace), pleated pockets for carrying items, overblouses with satin linings that would not creep up when using crutches, elasticized belts and hems that were adjustable to the individual's posture. They wanted bra-slips with center front zippers and stretchable fabrics for slip bodices.

Allen (1977) conducted an exploratory study for elderly handicapped women to (a) identify style features in outerwear (blouses, skirts, dresses, slacks, and sweater) preferred by physically handicapped females 65 years or older; (b) design a garment incorporating these features; and (c) compare these garment to clothing now worn by elderly handicapped women who would then rate both sets of clothing. The sample included five elderly women, 74 to 84 years old, with arm and/or leg disabilities who were all residents of nursing and convalescent facilities in Bozeman, Montana.

Two of the women were totally paralyzed on one side of their bodies, were classified as bed rest patients, and used wheel chairs; one of these women wore a leg brace. Both required complete

dressing assistance. Three women were classified as ambulatory, or able to move without a wheel chair. Two of these women had arthritic arms and legs, but were able to dress themselves. The other woman had limited mobility in one arm and needed help in dressing.

Investigator contacted nursing home personnel to obtain information on each woman's disability, her capacities in dressing, and the devices or aid each woman used that affected her clothing.

Each woman was interviewed to determine her clothing problems in relation to her physical handicaps and age. The women and nursing home staff pointed out certain features. They thought X were important for the clothing of arm and or leg disabled elderly women. The features they mentioned most often were comfort, ease of putting on and taking off clothing, ease of fabric care, becoming style, and attractive colors.

Patients and nursing home personnel seemed to prefer style features: shift-style one piece dresses with semi-fitted waists, A-line skirts, lowered necklines, short raglan sleeves or straight sleeves without cuffs, zipper and large button fasteners, long center-front closures, knit-fabrics, and large patch pockets.

The final dress design was developed incorporating the above functional features: one piece, full length raglan sleeves, and

elasticized waist, large patch pockets, a long front zipper opening, and its length extended below the knees.

To determine the effectiveness of the functional features of the women's present clothing and the designed dress, clothing was rated by the women subjects, the nursing staff, family members (when available) and investigator.

The first rating was scoring of women subjects' present clothing by the nursing staff and family members. This rating's purpose was to rate functional features and determine the women's difficulty with fasteners.

The highest score for any feature could have been 65 and the lowest 13. The ratings ranged from 35 to 45 "Becoming attractive style and colours" received the highest score (45) and "Convenience/easy-on, easy-off" received the lowest score (35). This rating was about equal to "good" or average in the scale the investigator developed.

Eleven out of thirteen of the responses in the study expressed difficulty in manipulating fasteners on the women's present clothing, indicating that a functional garment for these women should eliminate fasteners difficulty. Zippers and buttons were mentioned most frequently as difficult fasteners; the least difficult seemed to be grippers. Investigator chose a zipper, however, for the final design dress because a zipper was easier



than grippers to manipulate in long front opening.

The second rating by the nursing staff and the family members was made on the features in the functionally designed garment, one month after the women began wearing it. Since the investigator used only zippers - and the women had not liked zippers too well in their present garments, investigator was especially interested in the reactions.

The highest possible score for the design dress was 65 and the lowest was 13. Ratings ranged from 51 to 65. "Convenience/easy-on, easy-off" received the highest score (62); "resistance to soil and spills" and "becoming attractive style and colors" received the lowest score (51). Both these ratings, however, were higher than the ones participants gave for those characteristics of the women's present clothing.

According to the ratings of both the women's present clothing and the design dress, the design dress permitted two women to dress without aid, one woman to dress with minimal aid, and two to be dressed with greater ease.

The ease-in-dressing feature ranked lowest in present clothing and highest in the design garment. The design garment enabled each woman to dress or to be dressed within a reasonable length of time, minimized the strain of dressing, and encouraged each woman to wear the dress often.

The above researches helped the present investigator to be familiar with many similar researches and the various methods and techniques used in these researches.