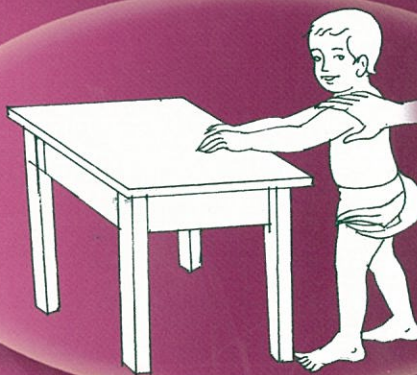


Home Instructions on Physiotherapy

In the field of Mental Retardation



**National Institute for the
Mentally Handicapped**

Home Instructions on Physiotherapy In the field of Mental Retardation

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ISBN : 81 89001 83 3

Printed at :
Sree Ramana Process Pvt. Ltd.,
Secunderabad - 500 003. Ph : 040-27811750

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FOREWORD

As per the NSSO (National Sample Survey Organization) report December 2002, the incidence of mental retardation associated with physical disability is about 40%. It was noted that per 1,000,00 persons with mental retardation having associated with physical disabilities there were 1046 persons in the rural areas and 901 persons in the urban areas.

This high magnitude of occurrence calls for early intervention to prevent disability and complication and also enhance development and strategies to reach the unreached.

Most of these persons live in rural areas where professional help and accessibility is very less. As these persons are taken care of by their parents and caregivers, it becomes a necessity to educate the parents, caregivers and primary health workers to help in carrying out therapeutic exercises at home.

The book is specially designed for the persons with mental retardation associated with physical problem. The exercises mentioned are easy to be followed by parents and caregivers. Every exercise is supported with illustrations and diagrams. The book also provides information on precautions to be taken when giving intervention programme.

The persons having Mental Retardation associated with physical disabilities if neglected may lead to secondary deformities and disabilities. In order to prevent secondary problems, and helping to catalyze or to bridge the gap between the normal development and delayed development, this book details the importance of various positions, activities, therapies, suitable exercises and their uses that can be practiced by parents and caregivers with minimal technicality.

I am sure it will be a useful guide to parents, caregivers, primary health rehabilitation workers and reaches the services to the most needy people.

Dr. L. Govinda Rao

PREFACE

The manual, "Home instructions on physiotherapy in the field of mental retardation" is an outcome of the project titled "Teaching and Training Material on Physiotherapy". This manual is specially designed for parents, caregivers and primary health workers to serve as a guide for handling children with Mental Retardation associated with physical disabilities. It addresses various aspects of positioning and exercises required for motor development such as carrying, head control, rolling, crawling, sitting, trunk control, standing, walking and hand functions.

Apart from this, important aspects related to range of motion and stretching are also addressed. Appropriate interventions for each area of motor development have been given in detail. The activities mentioned are duly supported with self-explanatory illustration, photographs and line drawings. Special emphasis is given to make the text simple and lucid, with stepwise instructions, illustration, photographs are given for the benefit of parents and grass root level workers. Each aspect of motor development is organized in sequence. Specific item and activities for intervention are also given.

A section in the book concentrates on instructions for utilizing resources available at home during the physiotherapy sessions. Glossary is given in the first page and also as a foot note wherever it was necessary. It consist of technical terms and their meaning in common language for better understanding by parents and primary health workers.

The exercises mentioned in the book are based on the practical experience and feed back from parents. The therapy programmes are specially designed to the persons with mental retardation or cognitive impairments.

It is hoped that manual would be beneficial for parents, paraprofessionals and primary health workers working in the filed of Mental Retardation.

R.C. Nitnaware

ACKNOWLEDGMENTS

I place on record, my deep sense of gratitude to Dr.L.Govinda Rao, Director, NIMH for his encouragement and guidance in research as well as administrative support for the smooth conduct of research. His direction to the project has been constant and unflinching. I am also thankful to Director for writing an encouraging foreword for the book.

My sincere thanks to Dr. Jayanthi Narayan, Deputy Director(Admn.), NIMH for all the administrative support and encouragement to complete the project. I also thank Mr. T. Pitchaiah, AO, Mr. G.V. Reddy, AAO(PA&M) and Mr. V. Rama Mohan Rao, AAO(TP&S) for their accounting, administrative and academic support.

I wish to place on record my sincere thanks to Dr. Amarjyothi Persha, Asso. Prof., Ex. HOD of Medical Sciences, NIMH for her continual support and contribution to the content of the book.

It is my pleasure to thank Shri N.C. Srinivas, Lect. in Speech Pathology & Audiology and Mr. K.V. Subba Reddy, Physiotherapy Asst. for their encouragement and support in completing this book.

I wish to thank all the Heads of the Department, in NIMH who spent their valuable time in giving their suggestions and comments. My sincere thanks to all the experts in this field mentioned below, who helped in completing this book by giving their valuable advices and comments.

Ms. Tessa Hamblin, Director, Spastic Society of India, Kolkata

Ms. Ella Dsouza, Director, Happy Hours Center, Mumbai

Dr. JVS Vidyasagar, Prof., HOD of Orthopaedics, Kamineni Institute of Medical Sciences, Hyderabad

Dr. Ashutosh Pandit, Officer Incharge, Composite Regional Center, Bhopal

Ms. Aruna Ravipati(Lect. in Physiotherapy, Composite Regional Center, Bhopal)

Ms. Poonam Suchdeva(Lect. in Occupational Therapy, Composite Regional Center, Bhopal)

Mr. K. G. Krishna kumar(Physiotherapy, Guest Faculty, EIS, NIMH)

Ms. K.R. Nawvi(Physiotherapy, Guest Faculty, EIS, NIMH)

I am grateful to the children and their parents for their co-operation in the research, without whom the project would not have been completed.

It was a delight to work with the team of research staff who worked sincerely, cheerfully and contributed to the project immensely and whole heartedly. I wish to acknowledge the efforts of the following research assistants who have worked for the project:

Mr. M.S. Raju, Physiotherapist

Mr. P. Srinivasa Rao, Physiotherapist

Mr. S. Laxmikanth, Physiotherapist

My deep indebtedness to the untiring and unstinted help of Mrs. N. Pushpa with her immense patience and tolerance. She was involved in typing, computerized art work, retyping, correcting and editing during the preparation of this manuscript.

My sincere thanks to all my friends and colleagues for their genuine desire to help and contribute through valuable suggestions for improving the manuscript.

I thank to Sree Ramana Process Pvt. Ltd. for printing this book.

ABOUT THE BOOK

This book titled “Home instructions on physiotherapy in the field of mental retardation” gives details about physiotherapy in mental retardation and developmental delay. There is information on home based management and its importance. It also tells about the need to perform home based management and in what way it is helpful for children with mental retardation associated with physical problems.

It gives guidelines on how to perform exercises if the child is having delayed motor milestones associated with mental retardation. It has been written for parents / caregivers and primary health workers to perform exercise therapy on the child who is having delayed motor milestones.

This book gives guidelines on activities to enhance motor milestones; each motor milestone is taken and activities to enhance it have been provided. It consists of special precautions to be taken for children with mental retardation and special guidelines to be followed while performing exercises. Other than motor milestones it also details on hand functions, range of motion, stretching, use of physiotherapy equipments and activities to stimulate vestibular system.

This book has been written in simple language which is easy to understand. There is a glossary also given which consists of technical terms and its simplified meanings. It also consists of photos, illustrations and line sketches for better understanding and performing exercises.

Introduction

HOME BASED PROGRAMME

Home based programme has gained lot of attention and focus in recent years. The children stay with the parents / caregivers most of the time. So they have the right opportunity at appropriate time to perform exercisetherapy, positioning and also avoiding certain postures as a preventive measures.

The mother / caregiver know the child better than any other person. So if we train or teach the mother or caregiver the importance of home based programme and how to perform the exercises. They will be able to perform better because constantly they are in touch with the child and do the therapy programme, so these programmes will help the child in gaining the motor performance.

CEREBRAL PALSY

Definition: Cerebral palsy is a condition which is caused by damage to immature brain or developing brain before birth, during birth or after birth. It is a non progressive condition which causes problems in various areas like motor, speech, vision, hearing etc.(Cerebral means brain, Palsy means dysfunction)

There are different types of cerebral palsy:

1. Spastic type: There is stiffness in the muscles
2. Flaccid type: In it there is looseness or floppyness in the muscles
3. Ataxia: There is less coordination in small muscles of hand and trunk. There are small rhythmic movements whenever the child is performing any activity.
4. Athetoid: Here the child will have involuntary movements or undesired movements, not only during any activity but also during rest.

Identification of the child with cerebral palsy : We can identify the child with cerebral palsy if the child is having delayed motor mile stones. The normal motor mile stones are :

MOTOR MILESTONES	NORMAL TIME PERIOD
Neck control.....	3-4 months
Rolling.....	4-5 months
Sitting.....	6- 7 months
Kneeling.....	7-8 months
Half kneeling.....	8-9 months
Standing.....	10-11 months
Walking.....	12-14 months

When we know normal motor milestones then we can identify the children with delay in development of motor milestones. By early identification of any delay we can bridge the gap between normal motor development and delayed motor development.

POSITIONING AND ITS IMPORTANCE:

In children with cerebral palsy, there will be abnormal tone in the muscles. So, to regulate the tone, positioning is used; with it we can develop

- Normalization of tone
- Increased muscular activity
- Decreased abnormal reflexes
- Increasing the normal alignment in the body
- Increasing normal movement patterns.
- Decreasing abnormal movement patterns.

Deformities

Deformity means any deviation from normal alignment of any part of the body.

Deformity results from the malformation of any part of the body. Impairment or loss of function in any part of body leads to deformities and inturn leads to disabilities.

GLOSSARY

TECHNICAL TERMS AND ITS SIMPLIFIED VERSION OF MEANINGS

1. Spasticity - Stiffness.
2. Flexed - Bent.
3. Upper limbs - Arms, Forearms and hands.
4. Erect - Straight.
5. Gravity - It is a force which acts towards the ground. It pulls all the objects towards the ground.
6. Sensory motor stimulation - It is a stimulation which increases the touch and muscle sensations.
7. Extensor muscles of neck - Muscles of the back of the neck region.
8. Passive movements - The movements of hands and legs performed by parents/therapist on the child for therapy.
9. Bolster - It is a round pillow.
10. Weight bearing - Putting body weight on the hands and legs.
11. Head approximation - Compression or pressing the head region.
12. Long sitting - Sitting with knee in straight position.
13. Symmetry - Equal.
14. Lying - Sleeping.
15. Alignment - Position.
16. Shoulder girdle - The joints in the shoulder region or the area surrounding the shoulder region.
17. Antigravity - Against gravity.
18. Extended - Straightened.
19. Shoulder girdle - (See No. 16 point)
20. Pelvic girdle - Is the area below the lower back.
21. Rocking - Swinging.
22. Gradually - Slowly.
23. Locomotion - Moving from one place to another.
24. Muscle power- Strength of the muscle.
25. Stability - Without any movement.
26. Position - Placement, placing.

27. Facilitate - Making or to helping or assisting.
28. Supine - Sleeping on the back.
29. Mobility - Movement.
30. Prone - Sleeping on the stomach.
31. Equilibrium - Stable.
32. Balance reaction - The reaction which helps in gaining balance.
33. Progression - Making progress.
34. Primitive - Old.
35. Tone - Condition of muscle which can be tight, loose or normal.
36. Hypotone - Less tension in a muscle the muscle appears to be loose and floppy.
37. Crawling - Movement from one place to other with knees bend and hands straightened position.
38. Tilt - Shifting.
39. Diagonally - Opposite or closed pattern.
40. Weight transferring - Shifting the weight.
41. Bilateral - Both.
42. Strapping - Tying.
43. Adductor bar - A bar kept in between two thighs so that to prevent muscle tightness in inner thigh muscles.
44. Inhibits - Reduces.
45. Unilateral- One side.
46. Side sitting - Sitting on one side with arm support on one side and legs on other side.
47. Squatting - Is a position in which we sitting in toilet, it is also called as toilet sitting position.
48. Halfkneeling - One leg in foreword position and other one is behind for support.
49. Splints - It is a supporting device used to keep the limbs in correct position.
50. Gaiter - Is a supporting device used to keep the leg in straight position.
51. Transfer of the body weight - Shifting body weight.
52. Balance boards - It is a device which is used for balance training in sitting or standing.
53. Trampoline - It is a instrument used for jumping and bouncing.
54. Involuntary - Movement done without their will (undesirable movement).
55. Gait training - Training the children to walk in correct manner.

56. Reciprocal - Alternate.
57. Parallel bar - Is an instrument used for the gait training.
58. Hemiplegia - It is a condition in which one side of the body is affected.
59. Shoulder elevation - Shoulder is moved upwards.
60. Shoulder Internal rotation - The shoulder will move inward movement.
61. Sensitivity - Is the sensation either increased, decreased or normal.
62. Midline orientation - It is when the child can take or hold objects in front of him with both hands. Either in lying or any other position.
63. Bilateral reaching - Reaching with both hands.
64. Sand bag - A bag with sand is tied on the limbs and used for strengthening the muscles.
65. Plastacine - Is a device used to strengthen the hand muscles.
66. Transfer of objects - Moving the objects from one place to other.
67. Stretching - Moving the limb in opposite direction of the tight muscle.
68. Range of motion - Is the degree of movement allowed by any joint.
69. Contractures - It is the tightness in a muscle. It is two types fixed and stretchable.
70. Deformities - In it there are muscular changes and bony changes which are irreversible.
71. Extensibility - It is the relaxation of muscles.
72. Contractibility - It is the shortening of the muscle during any movement.
73. Mobilization - Movement.
74. Dorsiflexion - Moving the ankle joint upwards.
75. Soft tissues - Muscles, ligaments etc consists of soft tissue.
76. Equinus - The toes and ankle facing down words.
77. Adductors of thigh - Are the muscles which lie in the between middle part of the thigh.
78. Spasms - It is protective tightness in muscles.
79. Pronation - The palm will face down words.
80. Vestibular stimulation - It is the system which gets stimulated when the person is moved on ball, rocked or on swing.
81. Righting, Balance, Equilibrium - These are the reaction which are developed when we give rocking movements, Balancing activities, other therapeutic exercises.

Chapter-1

POSITIONS FOR CARRYING

Positioning :-

Do not carry a cerebral palsy child or a child having stiff lower limbs, with both legs / lower limbs close to each other, this increases tightness and spasticity¹. Special care should be taken by separating the legs while carrying the child.



Fig. 1



Fig. 2



Fig. 3

1. Place the child in a curled up position with shoulders forward and hips flexed², place arm behind the head. (see figure 1) This can be given to a floppy child.
2. Place the child facing you with the child's leg around your hips, hold under buttocks. (see figure 2)
3. Hold child with one hand on child's buttocks and the other hand on child's back. (see figure 3) This can be given to a stiff child.

(These three figures give descriptions about carrying a cerebral palsied child.)

Chapter-2

EXERCISES TO DEVELOP HEAD CONTROL

Purpose

Development of head control is of prime importance because most of the activities and functions depend on the development of head control.

Following activities will help to develop head control.

1. Place the child on prone wedges in prone position with extended upper limbs³ on the floor. Support is given at the chin to keep the head and neck up in straight and erect⁴ position. Put a toy in front so that the muscles are working against gravity⁵.
2. Place the child in a prone position on a table and upper limbs extended on the table. Place a toy in front and move it in upward direction so that he lifts the head.
3. Place the child prone on a bolster with extended upper limbs.
4. In sitting position hold the child's upper limb in such a way that, head should rest in between shoulder girdle, slowly and gradually move the upper limbs front, back and sides; controlled and rhythmical movements of head can be given. Care should be taken that jerky movements should not occur and a head should not drop down.
5. Child should be nursed in a prone position as far as possible and the child should spend most of his time in prone position.
6. Child should be put up in prone position on a inclined pillows.
7. Sensory motor stimulation⁶ on extensor muscles of neck⁷.
8. Massage with thumb on back of the neck.
9. Passive movements⁸ to head and neck.

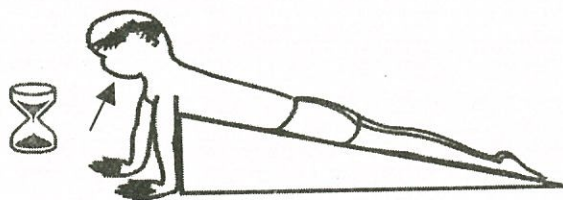


Fig. Head control over the prone wedges

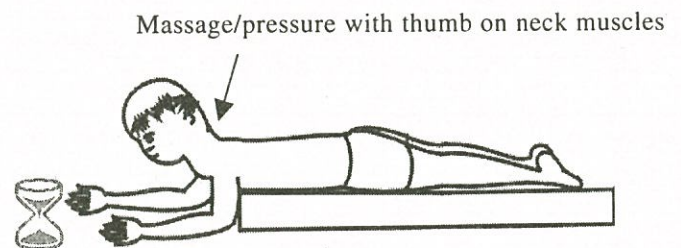


Fig. Prone position

³Upper limbs - Hands. ⁴Erect - Straight. ⁵Gravity - It is a force which acts towards grounds.

⁶Sensory motor stimulation - Excitation of touch and muscles.

⁷Extensor muscles of neck - Muscles of the back of the neck region.

⁸Passive movements - The movement performed by others on the child.

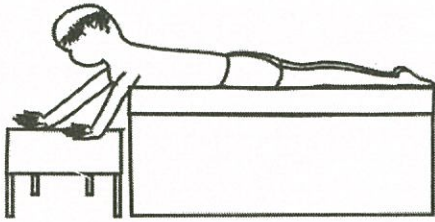


Fig. Head control in prone position with extended upper limbs on a stool

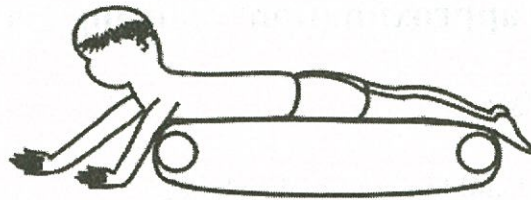


Fig. Head control in prone on bolster⁹ with extended upper limbs

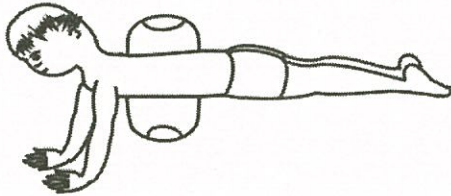


Fig. Head control in prone on a roll with weight bearing on shoulder

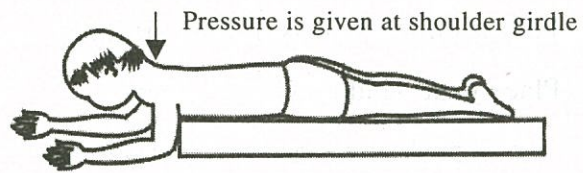


Fig. Prone on elbow and forearm

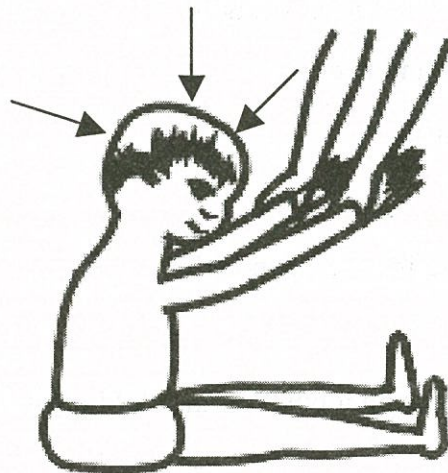


Fig. Front, back and sideward movements of head and neck

Uses

- Develops head control.
- Strengthens the muscles of head, neck and shoulder girdle.
- Develops weight bearing¹⁰ on upper limbs.
- Develops eye-hand coordination.

⁹Bolster - It is a round pillow. ¹⁰Weight bearing - Putting body weight on the hands or upper limbs and legs.

Head approximation¹¹ (putting gentle pressure on head)

Purpose

To assist child in holding head erect.

Instructions

- Put the child in cross or long sitting¹² position with head and trunk straight.
- Place your hand on child's head.
- Gently push down on head and release.
- Repeat it as long as possible.

Uses

- To help the child to keep head and neck straight.
- Develops symmetry¹³ of head and neck.
- Develops head and neck control

Desired response

Child will be able to maintain head in an erect position.

Undesired response

Back and neck will become stiff to avoid it position the child in sitting position on a chair or in the lap of parents / caregivers.

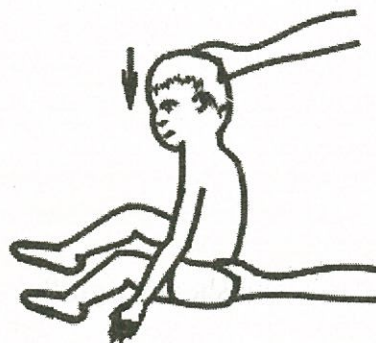


Fig. Head approximation in sitting

(Note : If the child having head and neck bend in forward direction or sideways then this position is not applicable.)

Head approximation in prone

Purpose

To assist child in holding head up while lying on prone position (forearm weight bearing prone lying¹⁴).

Instructions

- Place the child on his stomach.
- Position yourself in front of the child.
- Stabilize the child's head by placing your both hands on either side of the child's head.
- Child's neck and trunk should be straight.
- Apply gentle pressure on head in downward direction and release.
- Repeat it as many times as possible.
- Encourage the child to hold his head, neck and trunk in proper alignment¹⁵.

Uses

- Helps to develop head control.
- Develops weight bearing on forearms.
- Develops shoulder girdle¹⁶, trunk and neck stability.

Undesired Response

Back or neck will become stiff; head will come up too far.

Head will drop down, to prevent it stabilizing the neck by supporting appropriately.



Fig. Approximation in prone lying

¹⁴Lying - Sleeping. ¹⁵Alignment - Position. ¹⁶Shoulder girdle - The joints in the shoulder region.

Chapter-3

WEIGHT BEARING ACTIVITIES

Arm approximation prone over roll

Purpose

To enable child to bear weight on arms and to strengthen neck and shoulder muscles for better head and neck control and hand movements and reaching for objects.

Instructions

- Hold the child with both hands supporting at the elbows.
- See that the hands should be straight and allow the body weight of the child to fall on the hands.
- Gently push on the shoulder and release.
- Repeat it as many times as possible.

Uses

- Develops head and neck control.
- Strengthens the neck, trunk and upper limb muscles.
- Develops weight bearing on upper limb.
- Develops shoulder girdle stability.

Desired response

Child will be able to support own weight on hands with elbows straight, hands open, head erect.

Undesired response

Back, neck or arms will become stiff, hands will fist or elbows and head will bend. So to prevent it open the fist prior to weight bearing to prevent the head dropping downwards show the child some toys and slowly move the toys upwards so that he lifts the head.



Fig. Arm approximation in prone over a roll

Forearm support prone lying

Purpose

To develop weight bearing on forearm(In prone lying position).

Instructions

- Place the child in forearm support prone lying position.
- Support is given at the shoulder girdle.

Uses

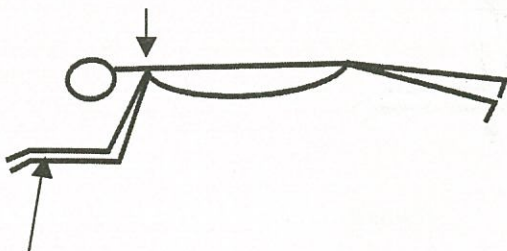
- Strengthens the muscles of shoulder girdle.
- Develops the head, neck, trunk control and stability.
- To achieve strength in antigravity¹⁷ muscles of upper body.



Fig. Coming to prone from side lying



Prone lying with forearm support



Weight bearing on forearm

Fig. Forearm support in prone lying



Weight bearing on extended¹⁸ arms in prone

¹⁷Antigravity - Against Gravity. ¹⁸Extended - Straightend

Forearm and knees weight bearing (prone position)

Purpose

To develop weight bearing on forearm and knees (In prone lying position).

Instructions

- Put the child on forearm and knees.
- Support is given at the shoulder girdle¹⁹ and pelvic girdle²⁰.

Uses

- Strengthens the muscles of shoulder girdle and knees and hips.
- Develops the head and neck control.
- Develops shoulder girdle, trunk and knee stability.
- To achieve strength in antigravity muscles.
- To develop strength in pelvic girdle.

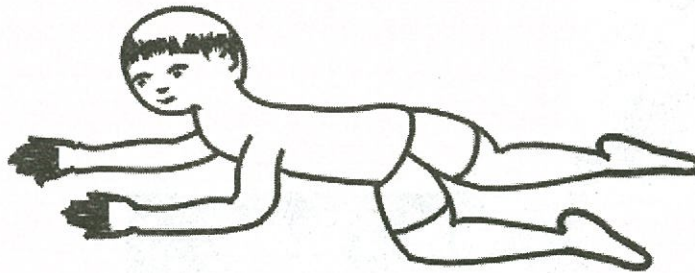
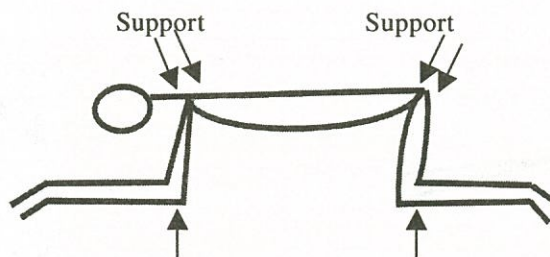


Fig. Forearm and knees weight bearing



Forearm support weight bearing

Knee weight bearing

Weight bearing on extended upper limb and knees (In prone lying position)

Instructions

- Place the child in prone position (i.e. weight bearing on extended upper limbs and knees). Either on bolsters or round pillows.
- Support the child at the pelvic and shoulder girdle, once the child is able to maintain this position then move the child in forward, backward and sideward directions (rocking²¹ movements).
- Gradually²² reduce the support and later encourage the child to do the movement on his own.

Uses

- Develops weight bearing on extended upper limbs and knees.
- Helps in locomotion²³ intern helps in crawling.
- Develops muscle power²⁴ and stability²⁵ in joints.
- Develop strength in shoulder and pelvic girdle.

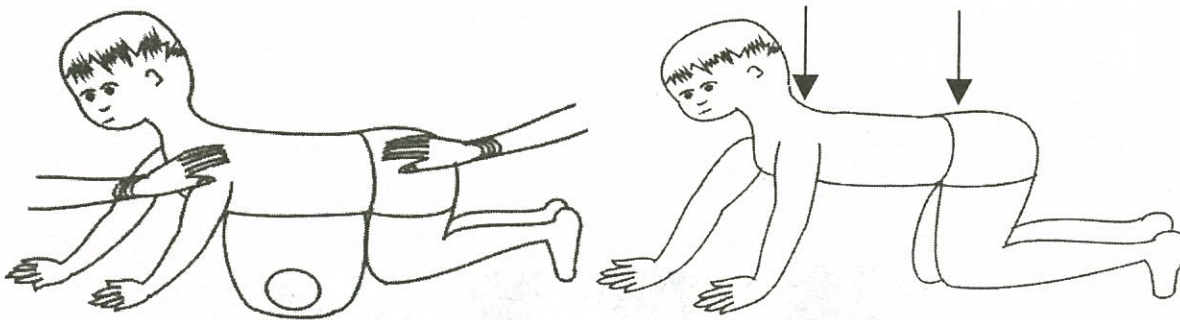


Fig. Prone kneeling position with and without support

²¹Rocking - Swinging. ²²Gradually - Slowly. ²³Locomotion - Movement from one place to another. ²⁴Muscle power - Strength of the muscle. ²⁵Stability - Without any movement.

Arm position²⁶ for head extension

Purpose

To facilitate²⁷ head, neck and back extension for better head control.

Instructions

- Place child on stomach, lying over roll or pillows.
- Position yourself on back of child.
- Support is given at the unstable joints.
- Apply gentle pressure from the shoulder girdle and press downwards.

Uses

- To develop head control.
- To achieve weight bearing on both arms.
- To develop neck and trunk stability.
- Strengthen the muscles of head, neck, back and upper limbs.
- Develops head extension and trunk stability.

Desired response

Child will be able to hold head erect.

Undesired response

Shoulder, neck, back or arms will become stiff.



Fig. Arm position for head and trunk control

Weight bearing on extended arms in prone

Purpose

To develop weight bearing on extended upper limbs.

Instruction

- Make the child to put weight on both upper limb.

Uses

- Helps to develop weight bearing on both arms.
- Develops supportive reaction of arms and upper limb function.
- Develops shoulder girdle stability.

Desired response

Child will maintain weight on straight arms with a straight trunk.

Undesired response

The trunk will sag or arms will bend and not maintain child's weight.

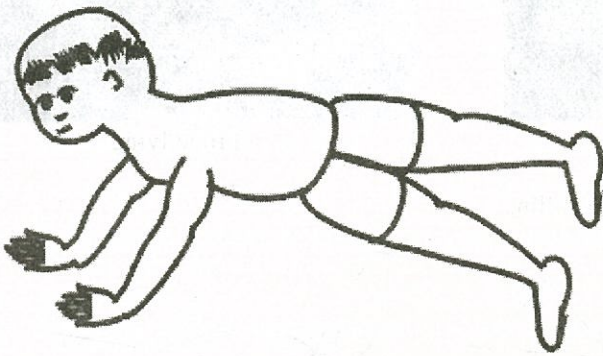


Fig. Weight bearing on extended arm in prone position

Chapter-4 ROLLING

Purpose

To facilitate early development of rolling over from supine to prone and prone to supine.

Instructions

- Put the child in a comfortable supine²⁸(on back)lying position.
- Position yourself on same side of the child.
- To make the child to roll over to right side. Stretch out the right upper limbs and bend the left lower limbs(turning towards right side).
- While giving support at left knee joint move the child from supine to side lying and then to prone position.

Uses

- Helps in mobility²⁹ of trunk.
- Child learns to turn to side and rolling over.
- Develop the symmetry of the body.
- Child learns to roll over from supine to side and then to prone and prone³⁰ to supine.



Supine lying



Side lying



Prone lying

Fig. Sequence of rolling

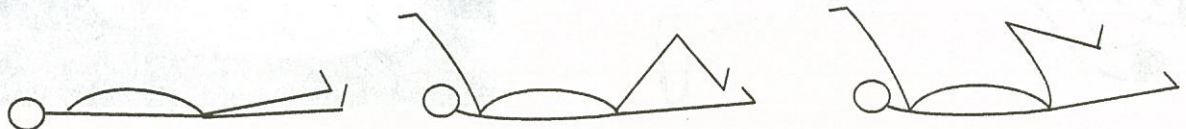


Fig. Rolling over

Lateral tilt (lying on back on mothers leg)

Tilting child away from the body

Purpose

To develop head and trunk righting and balance reaction³¹.

Instructions

- Place child in supine lying (head facing up) position on your legs. Try to keep the legs apart, and hold the child at the hips or the legs.
- Slowly tilt child to one side by slightly lifting your leg.
- Repeat with other leg.

Uses

- To develop turning to side and later rolling over.
- To develop shoulder girdle and trunk stability and mobility.
- To develop righting, equilibrium³² and balance reaction.

Desired response

Child will attempt to keep head and body in an upright position.

Undesired responses

Child will fall into the direction of the tilt. Legs or back will become stiff on the tilt. If the legs become stiff place a pillow under the knee of the child or bend the knees and do the activity.



Fig. Lateral tilt (tilting child away from the body)

³¹Equilibrium - Stable. ³²Balance reaction - The reaction which help in gaining balance.

Tilting on lap

Purpose

To develop head and trunk righting reaction.

Instructions

- Sit in a cross sitting position.
- Place the child on his side over your lap.
- Hold child's arms and tilt the child back towards you and then tilt child back away from you.
- Repeat.

Uses

- To gain mobility in trunk.
- Develop rolling over.
- Reduces the tightness in shoulder girdle and trunk.
- Develops shoulder girdle and trunk stability.

Desired response

Child will bend head himself back.

Undesired response

Child's head will fall or push backward.

*Progression*³³ : When child is responding well with head, tilt until child starts pulling forward with trunk.



Fig. Tilting on lap to develop trunk righting reaction

Chapter-5

CRAWLING

(primitive form of locomotion)

Purpose

Crawling helps the child to move from one place to another. (It is an alternate-rhythmical and reciprocal movements of the arms with the lower limbs). It is primitive³⁴ form of locomotion.

Instructions

- Put the child on extended upper limbs and knees in weight bearing position either on round pillows or bolsters.
- Initially support is given at pelvic girdle and shoulder girdle.
- Gradually reduce the support and let the child do it independently.
- Move the child from stable to unstable position by lifting one limb and put it in a forward direction then lift opposite lower limb and put it in a forward direction.

Ex. Lift right upper limb and put it in a forward direction.
Then lift left lower limb and put it in a forward direction.
Later change the sequence and progress the child by lifting right upper limb and left lower limb at once and vice versa.

[Note : This movement is given to children who don't have increased flexor tone³⁵ in the lower limbs. This movement can be done on children with a hypo tone³⁶.]

Uses

- Helps in crawling³⁷.
- Helps in weight bearing on all four limbs.
- Child learns to move from one place to another.
- Develops balance.
- Undesired response - child may keep head down.
- Helps in weight shifting activities.

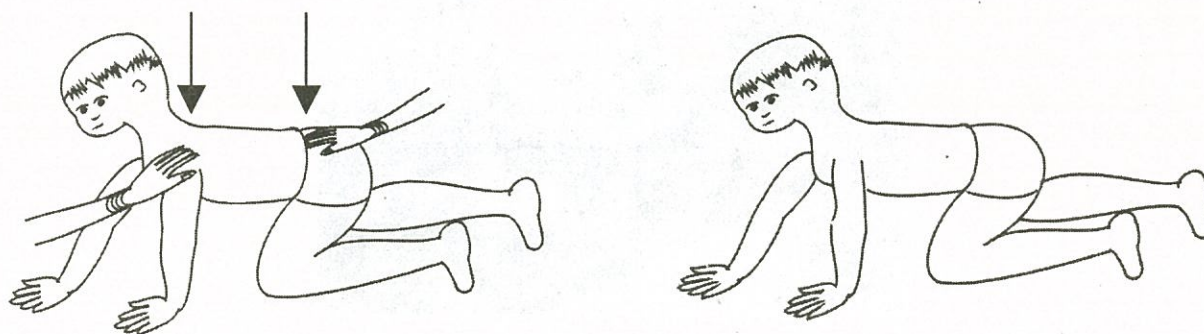


Fig. Crawling with or without assistance

³⁴Primitive - Old. ³⁵Tone - Condition of muscle tight or loose. ³⁶Hypo tone - loose or less tension in a muscle the muscle appears to be loose and floppy. ³⁷Crawling - Moving with knee bent and hands straightening position.

Chapter-6

TRUNK CONTROL

Trunk rotation

Purpose

To normalize the muscle tone and gain trunk mobility.

Instructions

- This activity can be performed in sitting.
- Put your hand on both sides of the child's shoulder girdle.
- Slowly turn child's body in one direction then the other, (towards right and left sides).
- Movement should be slow and rhythmical.
- Later encourage the child to do it actively.

Uses

- It gives relaxation in trunk muscles.
- Develops control of head and neck.
- Increase the range of motion of trunk and neck.
- Develops the shoulder girdle and trunk stability.

Desired response

Child's body will relax.

Undesired response

Child's hands and legs will become stiff.



Fig. Trunk rotation

Head and Trunk rotation to diagonal tilt (side to side movements)

Purpose

To develop head and trunk rotation.

Instructions

- Sitting on the floor with your legs crossed.
- Place child in your lap.
- Hold child's arms at elbows and keep elbow straight as shown in picture.
- Tilt³⁸ child diagonally³⁹, to the right and left sides, forward and backwards.
- Hold in this position for few minutes.

Uses

- To facilitate head, neck and trunk rotation towards right and left sides.
- Develops symmetry of the body.
- Strengthen the muscles of neck, shoulder girdle and trunk.

Desired response

Child will pull with the head and trunk towards sitting position. Healthy child will not need assistance in the activity.

Undesired response

Trunk will become stiff rigid or head will become straight instead of bending. Child may do internal rotation of shoulder to prevent it actively place the hands out wardly and rotate.



Fig. Trunk rotation towards right



Starting position



Trunk rotation towards left

Note :

- These positions are not used for children having bend legs or tightness in the back of the leg.
- If the children having straight legs then it is useful.
- It is also used as a developmental activity to teach the child to sit with correct weight bearing on hip joints.

³⁸Tilt - Shifting. ³⁹Diagonally - Opposite.

Bridging exercises

Purpose

To strengthen the muscles of pelvic girdle and back muscles.
To develop pelvic girdle stability.

Instructions

- Put the child straight on his back.
- Bend his hip / knees and place foot firmly on floor.
- Hold at pelvic girdle and lift the pelvis up.
- Then encourage the child to lift the lower back and hip to certain height, hold for 10-15 seconds, even more and bring it back to a original position.
- Repeat it for 5-10 times a day.

Uses

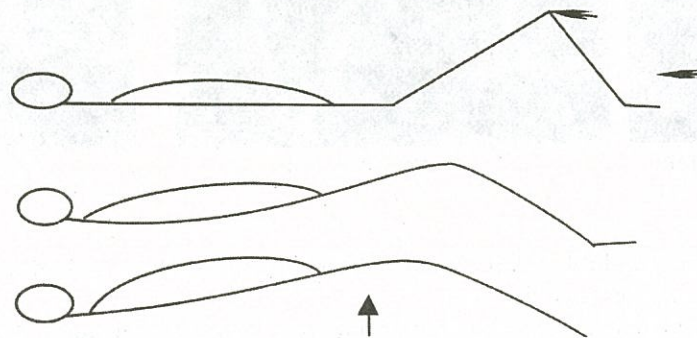
- Develops the pelvic girdle stability.
- Strengthen the muscles of hip and lower back.

Undesired response

Child may do internal rotation and raise the ankle and to the movement. To prevent it place a hand on the knees and put pressure downwards and do the exercises.



Fig. Activity of bridging in supine lying.



Chapter-7

ACTIVITIES FOR KNEELING

Upright kneeling from crawling

Purpose

To maintain kneeling (weight bearing on both knees) and to develop trunk control.

Instructions

- Place the child in a upright kneeling position (weight bearing on both knees).
- Support is given at pelvis.
- Later move the child from front to back and sideways.

Uses

- Weight bearing and weight transferring⁴⁰ on knee joints.
- Maintain or regain balance.
- Develops trunk, hip and knee stability and muscle power.
- Preparation for kneel walking (walking on knees).



Fig. Kneeling with the support of wooden chair, table and without support



Knee joint weight bearing

⁴⁰Weight transferring - Shifting the weight.

Half-kneeling

(One foot forward and one knee backward)

Purpose

It is preparatory phase for standing.

Instructions

- Place the child in this position (one foot forward and one knee backward).
- Support may be given either at knee or at pelvis / shoulder girdle.
- Pressure is given through knee downwards.

Uses

- It helps the child to learn, to bear weight on one foot and knee.
- Develops knee joint and foot stability / muscle power.
- Preparation for standing.

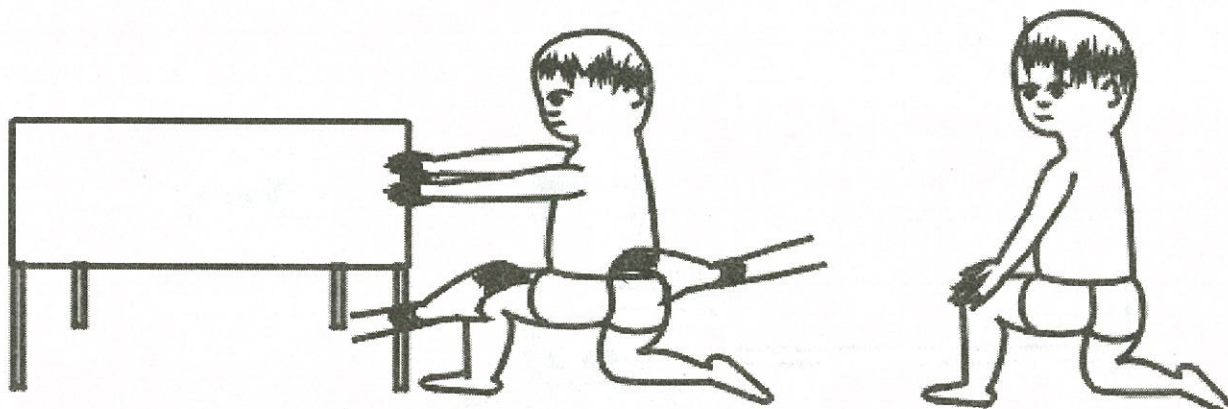


Fig. Half kneeling with support of the table and without support

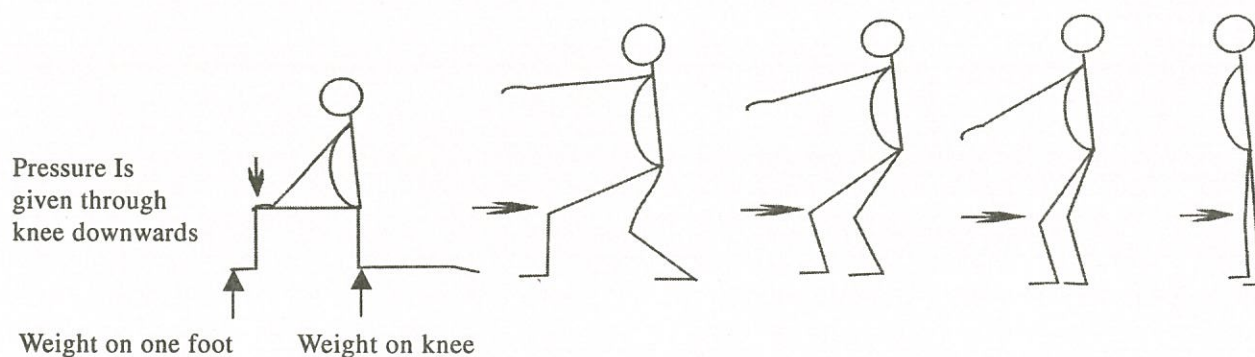


Fig. Half kneeling to standing

Chapter-8

ACTIVITIES FOR SITTING

To improve posture in sitting on chair

Purpose

To get bilateral⁴¹ symmetrical posture.

To prevent abnormal sitting.

To improve sitting posture.

Instructions

- Put the child in a sitting position on chair as shown in figure.
- Strapping⁴² are used when it is required (at shoulder girdle level or trunk or on foot, leg).
- Hand should be properly placed on the armrest.
- Foot should either rest on the foot rest or on the floor.
- Lower limb position (Trunk, hip, knee, and ankle at right angle to each other).
- A pillow or adductor bar⁴³ should be placed between the legs to prevent the crossing of legs.
- Activities can be facilitated by providing cut-out table in front of chair or on arm rest.
- If wheels are attached at the base of the chair it helps to move from one place to another.

Uses

- Develops the postural alignment of the body.
- Develops the normal sitting position.
- Prevents the deformities and tightness.
- Helps to maintain good posture in sitting.
- Inhibits⁴⁴ abnormal pattern of movements and facilitates normal pattern.

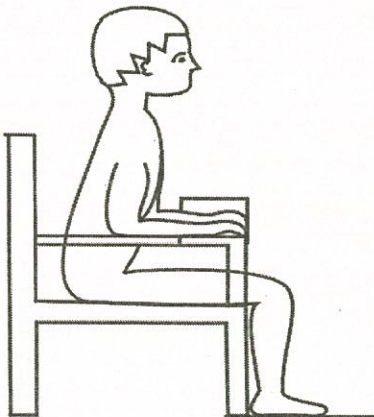


Fig. Ideal sitting posture in special chair

[Note : If the child is not able to maintain the correct posture then straps are used.]

⁴¹Bilateral-Both. ⁴²Strapping - Tiewing, ⁴³Adductor bar-A bar kept in between two thighs. ⁴⁴Inhibits - Reduces.

Cross sitting position

Instructions

- Place the child in a cross sitting position as shown in a figure.
- Place the child's upper limbs in extended position, in front of the child.
(Care should be taken that the weight bearing should be on both hip joints).

Uses

- Develops protective extension reaction of upper limbs (forward, sideward, backward).
- Develops upper limb weight bearing.
- Develop bilateral pelvic girdle or hip stability.
- One of the important developmental and functional positions.

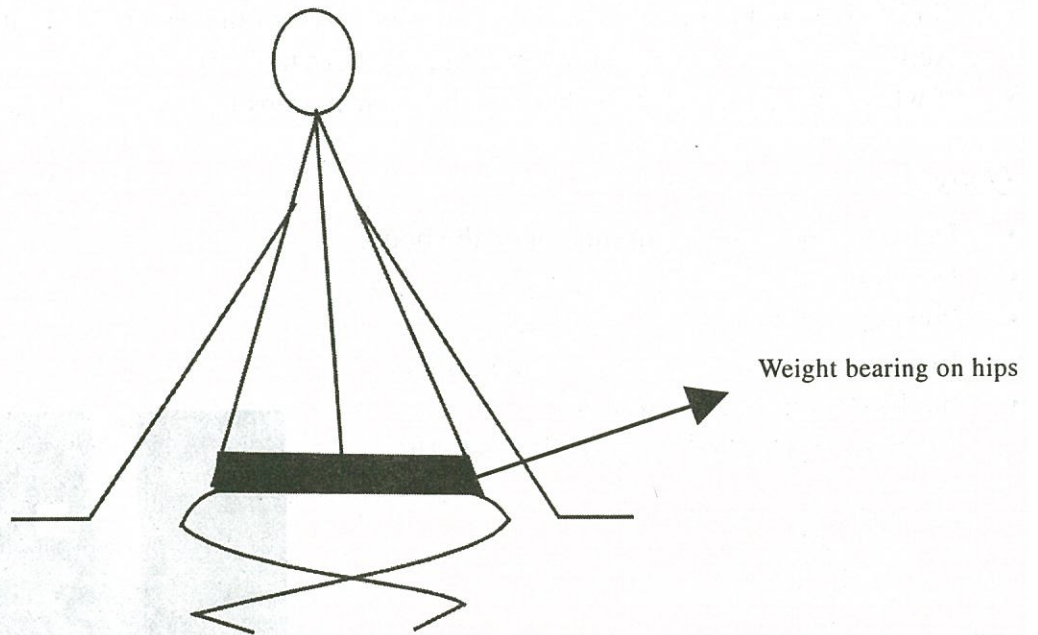


Fig. Cross sitting

Trunk relaxation in sitting

Purpose

To aid relaxation of trunk muscles.

Instructions

- Place the child in sitting sideways on your lap.
- Hold the child's arm(upper limb) in front of the chest with one hand and other hand supporting both sides of the shoulder girdle.
- Move the child from one side to other.

Uses

- Helps to develop trunk relaxation.
- Develops trunk rotation and stability.
- Facilitates the balance in sitting position.

Desired response

Child's trunk will relax.

Undesired response

Child's back will stiffen.

Child will push backwards with head or shoulders. To prevent it, flex the legs and hand and hold near the trunk.



Fig. Trunk relaxation in sitting

Side sitting (right and left side)

Instructions

- Place the child in a side sitting position as seen in figure.
- Weight bearing should be on one hip joint.
- Change the position after 5-10 minutes from right side to left side and vice versa.
- Put the child's upper limb extended either on left or right side for support.

Uses

- Develops unilateral⁴⁵ (one side) weight bearing on hip joint and hand.
- Develops unilateral hip joint stability.
- Develops trunk rotation.
- Develops unilateral supporting reaction of upper limbs.

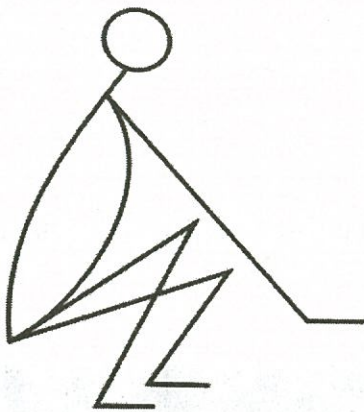


Fig. Side sitting

Sitting on parent's lap (to develop trunk control)

Purpose

To develop trunk control in sitting position and also trunk balance.

Instructions

- Make the child sit on your extended legs.
- Hold at the shoulder girdle and turn him towards left and right.

Uses

- Develops balance and coordination.
- Relaxes the trunk.
- Develop the trunk stability and mobility.
- Develops protective reactions of upper limb.

Note : Give the child plenty of time to respond to the tilt.

Desired response

Child's head will bend and turn to the side away from the tilt.

Undesired response

Head will bend to the side of the tilt, will go backward, or will bend forward.

Progression. When child is responding with head, move hands support towards the hips. When tilting, wait for the child to bend trunk away from side of the tilt.



Fig. Towards to right side

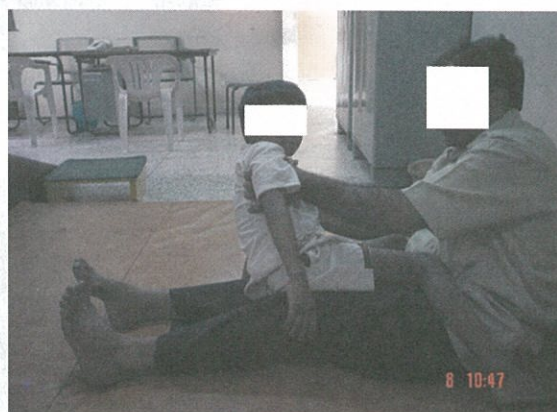


Fig. Towards to left side

Head and trunk reactions in sitting position.

Getting up from supine lying to sitting

Purpose

To teach the child to come up to side sitting⁴⁶ position.

Instructions

- Place the child in a comfortable lying posture.
- Position yourself on same side of the child.
- Move him from supine to side lying.
- Encourage the child to bear weight on other upper limb which is on floor.
- Hold the child with left upper limb which is free and pull him to sitting position.
- Encourage the child to use his right upper limb to come up to side sitting position.
- Encourage the child to transfer his body weight on right upper limb and gradually extend it and come up to sitting position.

Uses

- Child learns to come up to sitting position from lying.
- Develops unilateral weight bearing on upper limb.



Supine lying with stretched arm



Bending the lower limbs & turning to side



Side lying



Side sitting with extended arm



Weight bearing on extended arm & hip



Side sitting

Fig. Sequence of activities getting up from supine lying position to side sitting

Squatting

Training to sit in a toilet sitting position.

Purpose

To teach the child to sit in a squatting⁴⁷ position.

Instructions

- Put the child on a normal height stool, chair or table.
- Position yourself in front of child.
- To make the child squat, hold child's arm and pull him to a standing position and make him sit down on stool / chair and eventually on ground and eventually make the child to squat on floor.
- Gradually lower height of the stool or chair or on floor.
- Upper limbs can be used to support body weight in a forward direction.

Uses

- Useful for toilet sitting or squatting.
- Maintains the mobility in the lower limb joints.
- Strengthens the muscles of the hip and knee.
- Helps the child to sit in squatting position on ground and later in toilet.

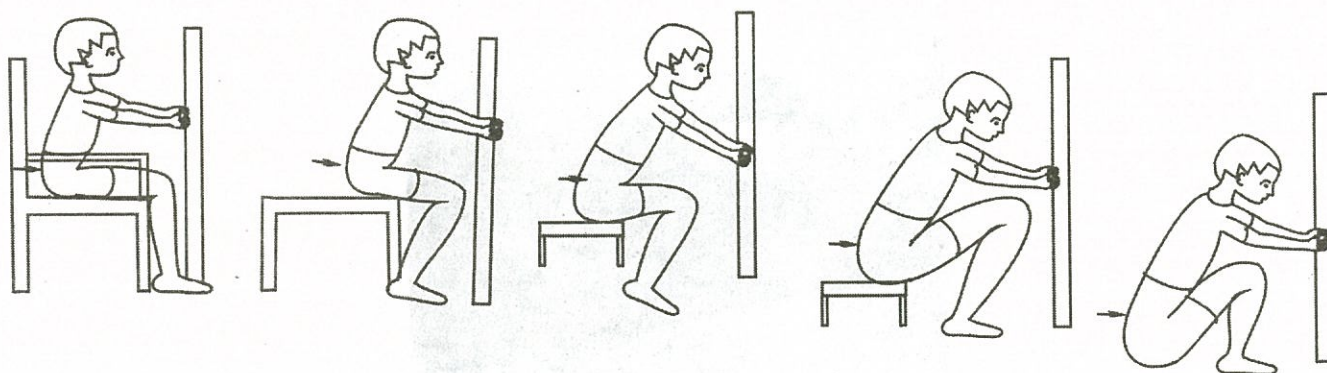


Fig. Sequence of squatting

Chapter-9

ACTIVITIES TO IMPROVE STANDING AND WALKING

Standing with support

Purpose

Preparation for standing and walking.

Instructions

- Make the child stand by extending knees.
- Put the child into a normal standing position.
- Support may be given either at the pelvis or knees.
- Assist him to get up to standing position from half kneeling,⁴⁸ by holding at knee joints and lift him to a standing position.
- Child can be made to stand against wall, corner of walls, window, cot, table, chair (support is given either at shoulder girdle, pelvic girdle or knee joints).
- Splints⁴⁹, gaiter⁵⁰ can also be used to keep the joint stable and maintain standing position.
- Once the child is able to maintain standing position, transfer his weight from front to back and sideways.
- Baby walker, standing frame, freedom stander, wooden cart can also be used to make the child stand.

Uses

- Prepare the child for standing.
- Prepares lower limb to bear weight and take over weight of body whenever it is transferred on lower limb.
- Develops supporting reaction of lower limbs.
- Coordination
- It helps in strengthening the lower limbs

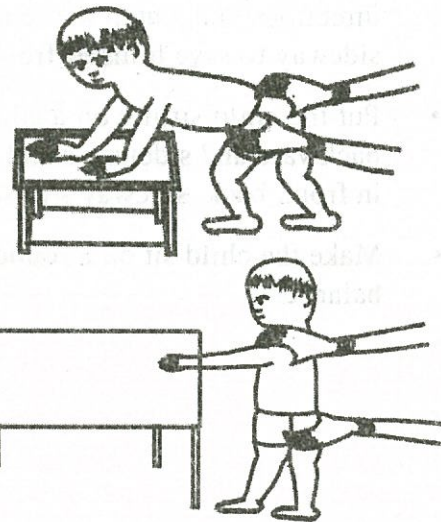


Fig. Standing with support from half kneeling

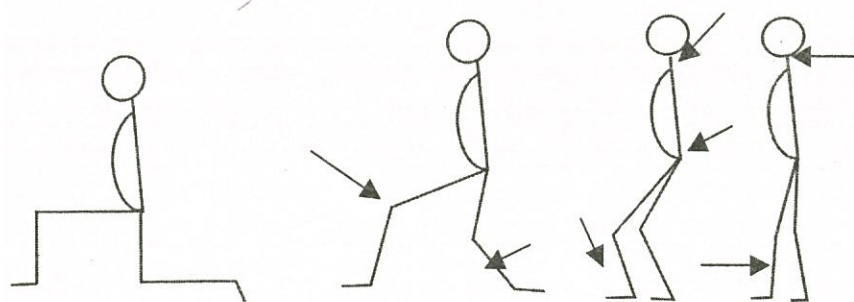


Fig. Stages from half kneeling to standing

⁴⁸Half kneeling - One leg is in forward position and other one is behind for support, ⁴⁹Splints - It is a supporting device used to keep the limbs in correct position, ⁵⁰Gaiter - Is a supporting device used to keep the leg in straight position.

Balance training (standing)

Purpose

To improve balance.

Instructions

- Make the child to stand in a normal standing position.
- Position yourself close to the child and watch his reaction and support him when he required.
- Push the child from back so that the child will move in a forward direction, or he will come on the toes or take one step forward.
- Push the child from forward so that the child has to balance on the heels or take steps backwards.
- Position yourself on the side of the child and push him from sideways so that the child has to balance on opposite side or he will come on opposite lower limb.
- Push or tap should be strong enough to disturb the child's balance.
- In cross sitting position give tap or push at the shoulder level in forward, sideward and backward directions and watch the reaction of upper limb. Child will throw his upper limb in front, back, sideway to save himself from falling down.
- Put the child sitting on a edge of the table, give a tap or a push at the shoulder level in forward, backward and sideway's and observe child's reaction, he will balance by throwing his upper limb in front, back, sideway's to save himself from falling down / and also watch lower limb reaction.
- Make the child sit on a round pillow or bolster and give sideward movements. So that it helps in balance.

Uses

- Develops balance and coordination.
- Strengthens the muscles of lower limb.
- Balance exercises helps to maintain or regain balance and prevent the child from falling down while walking.
- Helps to develop supportive reaction of upper limbs.

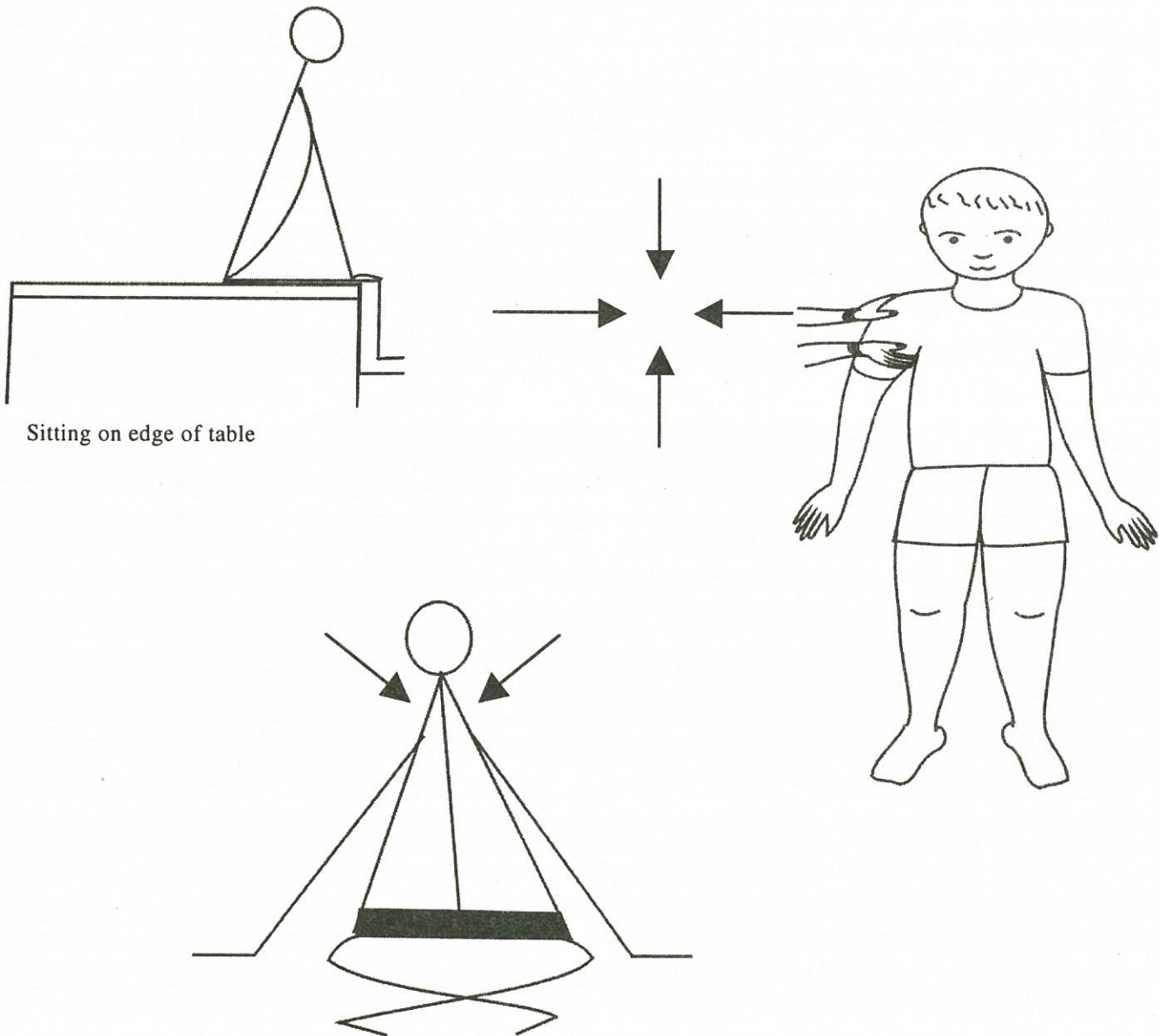


Figure. Push or tap is generally given at the shoulder or pelvic level, push should be strong enough to disturb the balance of the child-i.e. child should fall down.

Balance exercises

Purpose

To develop balance of the body.

Instructions

- Ask the child to stand on toes and on heels.
- Ask the child to transfer his weight from heel to toe and vice versa.
- Ask the child to stand on outer border of foot.
- Ask the child to stand on inner border of foot.
- Ask the child to stand on one lower limb and then on other lower limb.
- Ask the child to stand and walk in sandpit.
- Ask the child to stand on a balance board.
- Ask the child to walk on a line with one heel touching the other limb toes.

Uses

- Develops balance.
- Develops supportive reaction of upper and lower limbs.
- Develops stability and mobility of lower limb joints.
- Helps in walking.

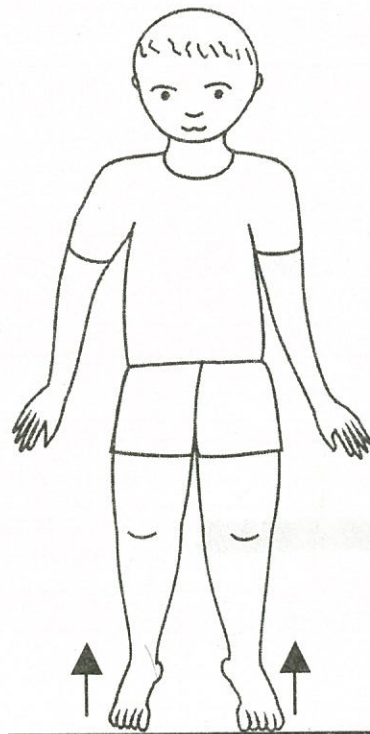


Fig. Standing on toes

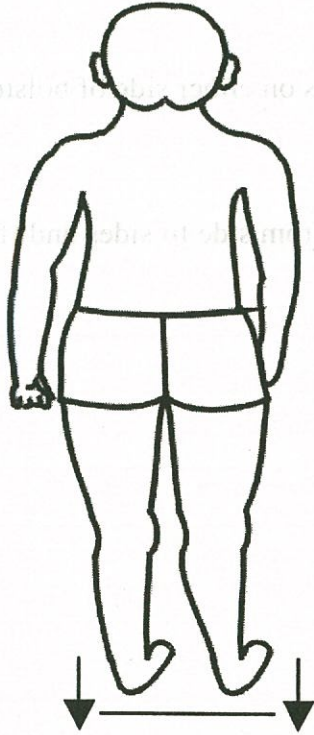


Fig. Standing on heels

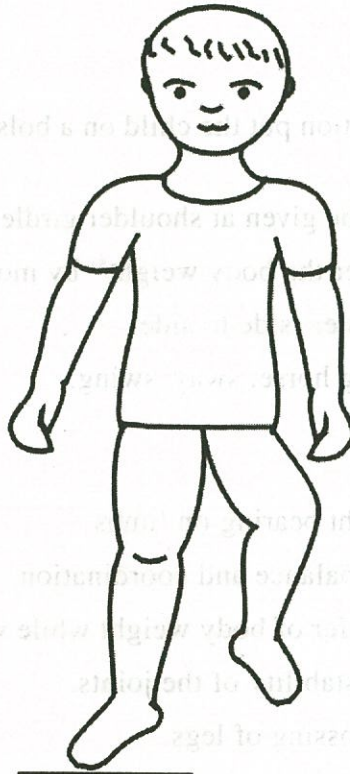


Fig. Standing on one leg

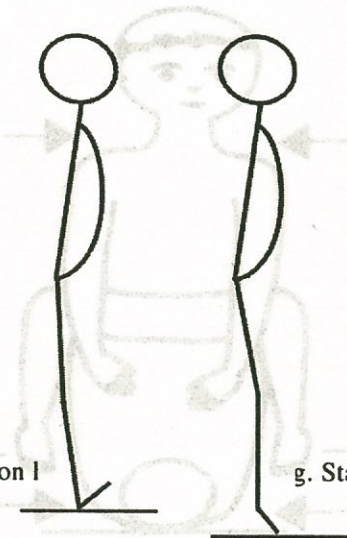


Fig. Standing on I

g. Standing on toe

Weight transfer - Sitting

Instructions

- In sitting position put the child on a bolster with legs on either side of bolster and foot placed on the ground.
- Support may be given at shoulder girdle.
- Slowly transfer the body weight⁵¹ by moving child from side to sides and (front/back).
- Move the bolster (side to side).
- Use of rocking horse, sway, swing.

Uses

- Develop weight bearing on limbs.
- Improves the balance and coordination.
- Assist in transfer of body weight while walking.
- Develops the stability of the joints.
- Reduce the crossing of legs.
- Child can learn to get up from this position.
- Pull the child to standing position by holding the upper limb and make him sit again on bolster.

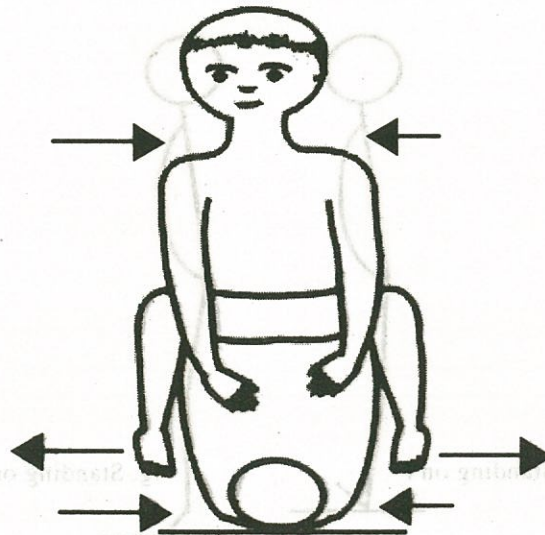
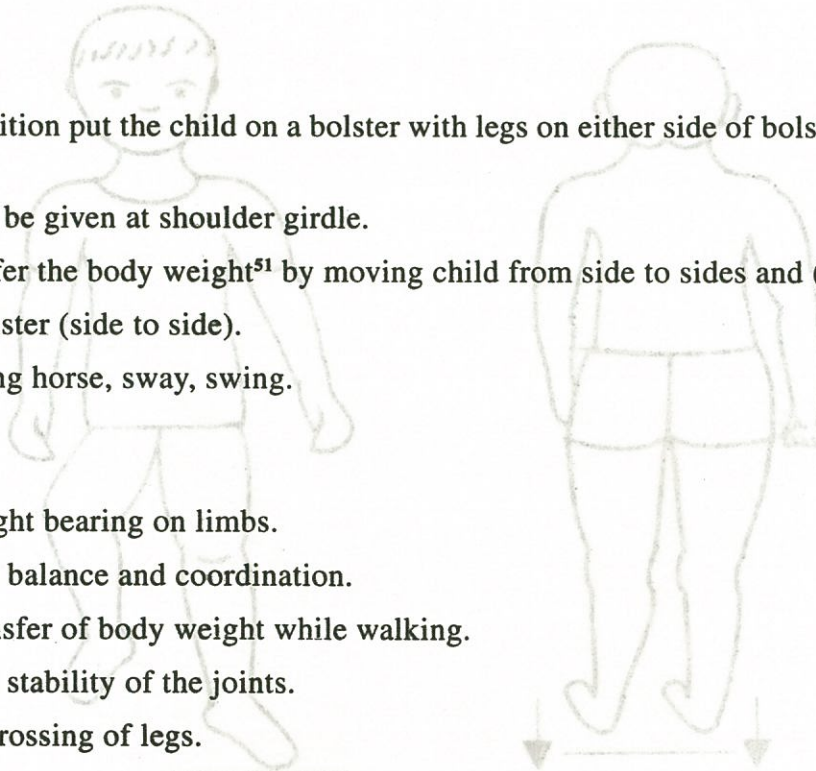


Fig. Weight transferring to right and left on bolster

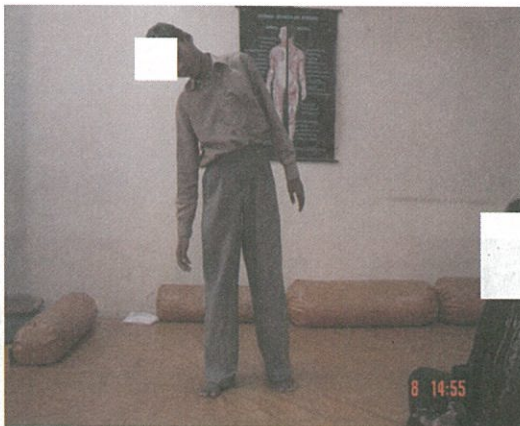
Weight transfer - Standing

Instructions

- Place the child in standing position with leg slightly apart.
- Position yourself at the back of the child and hold him at the pelvis level.
- Gradually transfer the body weight from forward to backwards and back to front and from right to left and left to right sides.
- Gradually reduce the support and encourage the child to do it independently.



Starting position to weight transferring



Weight transferring to right side



Weight transferring to left side

Balance training in standing

(These exercises are given to those children who have problems in balancing.)

Instructions

- Make the child to stand on balance board⁵², tilt board.
- Make the child to stand and walk on top of narrow platform.
- Make the child to stand and walk on a balance beam in forward, backward and sideways.
- Make the child to walk on uneven surfaces or on rough ground.
- Make the child to walk on a straight line.
- Make the child to walk forward, backward, sideways on the footprints drawn on the floor and also turn around in clockwise and anticlockwise direction.
- Make the child to stand on a bolster, walking on edges of mattress.
- Make the child to jump or bounce on trampoline⁵³ and mattress.

Uses

- These exercises are useful for children having problems in balance and coordination.
- Improves the balance and coordination.
- Helps in walking (gait training).
- Strengthens muscles of lower limbs.



Fig. Walking on the top of balance beam in forward direction and sideways.



Fig. Walking on mattress

⁵²Balance board - Is a devise which is used for balance training.

⁵³Trampoline - Is an instrument used for jumping and bouncing.

Walking

Purpose

To teach the child walking.

Instructions

- To make the child stand and walk, hold at pelvis level with both hands.
- Transfer his body weight on opposite side so that on one side the lower limb will be free. Then move the free lower limb in a forward direction, that makes one step.
- Repeat sequence on opposite side.
- Gradually reduce the support. Repeat the sequence number of times. Move the child front, back and sideways and weight transfer exercises can also be given.
- For children who have involuntary⁵⁴ or incoordinated movements, walking on the foot prints drawn on floor will be useful.
- Initially gait training⁵⁵ is given in parallel bar because of the following reason:
 - Because child develops normal walking pattern, that is the alternate rhythmic reciprocal⁵⁶ movement of upper limb with lower limb. Ex. Right upper limb forward then left lower limb - 2nd phase the left upper limb forward then right lower limb forward.
- Gains confidence in walking.
- Baby walker, wooden cart, CP walker can also be used to teach the child walking.
- Gains strength in the lower limbs.
- To gain balance and coordination.

Uses

- Learns walking.
- Develops balance and coordination while walking.
- Strengthens the muscles of lower limb.
- Develops normal pattern of walking.



Gait training in parallel bars



Walking in ladder floor mounted

⁵⁴Involuntary - Movements done without the will of the person (undesirable movement).

⁵⁵Gait training - Training the person to walk. ⁵⁶Reciprocal - Alternate.

Home Instructions on Physiotherapy in the field of MR

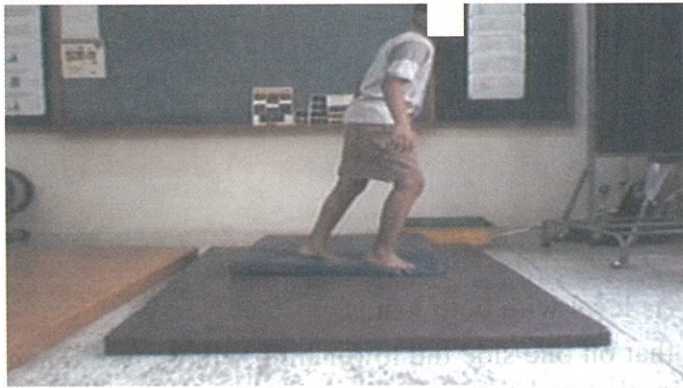


Fig. Walking on edges of the mattress

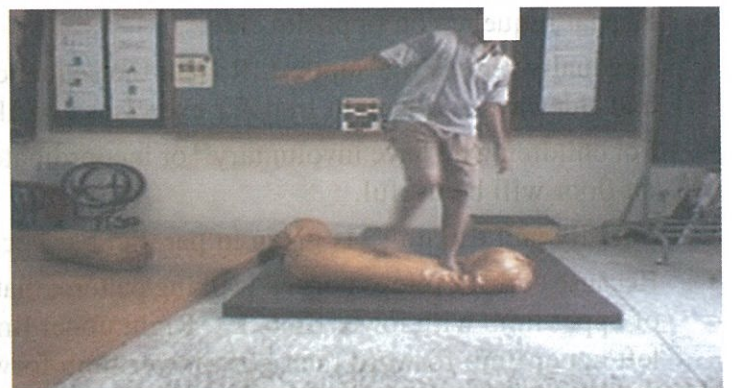


Fig. Walking on unstable objects (Bolster)

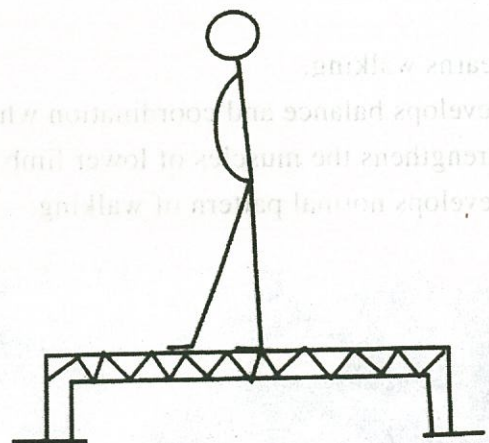


Fig. Walking on a narrow base

Turning

Instructions

- Draw foot prints on the floor.
- Ask the child to put the foot in the foot print and turn clockwise and anticlockwise direction.

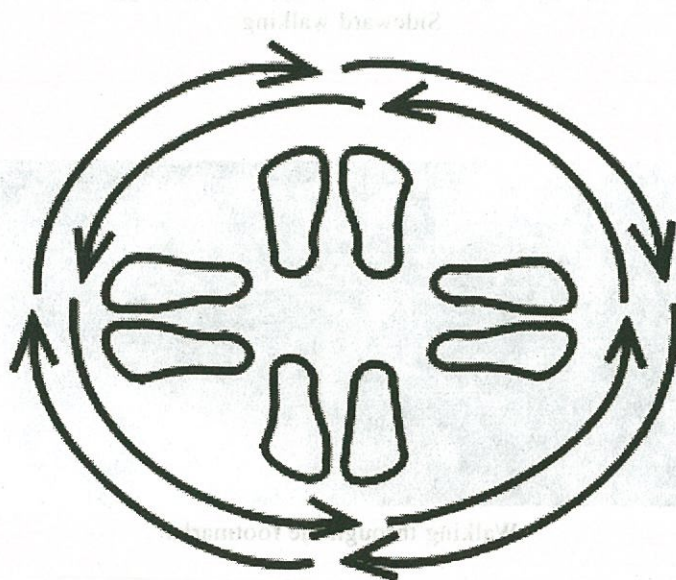


Fig. Foot prints for turning

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Sideward walking



Walking through the footmarks



Turning and placing the legs in circles

(Note: Ask the child to hold parallel bar⁵⁷ lift upper limb and put it forward then ask the child to lift opposite lower limb and put it in a forward direction. Repeat the sequence.) (Left upper limb & Right lower limb, Right upper limb & left lower limb).

⁵⁷Parallel bar - Is an instrument used for walking with support.

Chapter-10

ACTIVITIES TO IMPROVE HAND FUNCTIONS

Approximation through the shoulder (Correction of shoulder girdle alignments)

Purpose

To assist child in holding shoulder girdle and trunk erect.

Instructions

- Place child in a comfortable sitting position.
- Position yourself facing the child behind the child.
- Support the shoulder girdles on both sides(upper limbs extended).
- Gently apply pressure on the shoulder, press down and release.
- Repeat 5-10 times.
- Hold at trunk and shoulder girdle on both sides and give firm pressure downwards.
- Repeat the same procedure for 5-10 times.

(Note: It should not cause discomfort to the child.)

Uses

- Prevents forward bending of the shoulder girdle, head and neck.
- Helps to correct posture of head, neck and trunk.
- Helps to maintain erect posture(straight posture).
- Strengthen the muscles of trunk, shoulder girdle, head and neck.

Desired response

Child will be able to sit with an erect back.

Undesired response

Neck, back or legs will become stiff to prevent it position the child in comfortable sitting position.

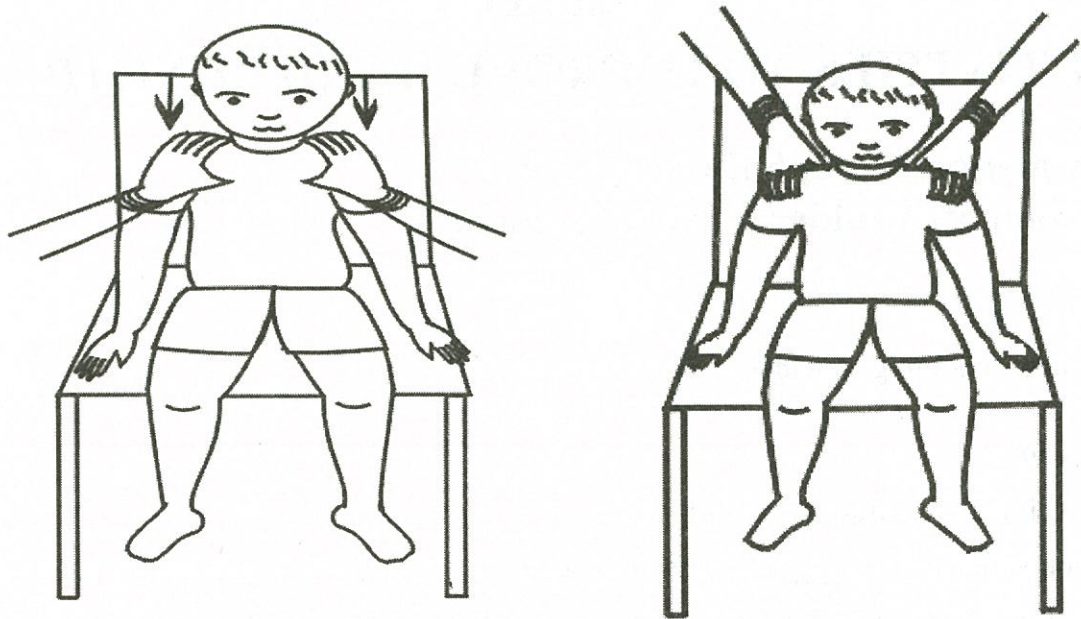


Fig. Approximation of shoulders



Fig. Approximation of shoulders in sitting



Fig. Approximation of upper back in sitting

Apply gentle pressure on shoulder girdle downwards. Arrows indicates pressure.

Stabilizing the arm while standing (against wall, almirah, window or on stool) (To control involuntary movements)

Instructions 1

- Ask the child to stand in front of the wall, window, almirah.
- Position yourself at the back of the child.
- Ask the child to put weight on extended upper limbs against wall, stool, window.

Putting weight on extended upper limb

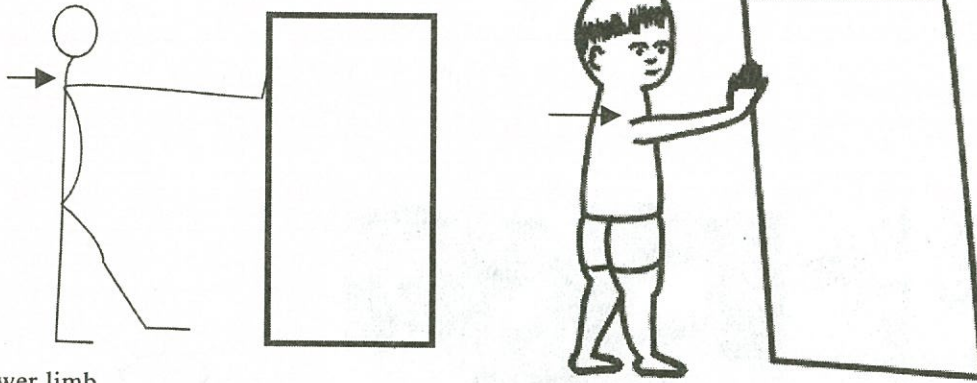


Fig. Stabilizing posture against a wall, almirah

Instructions 2

- Ask the child to bend forward and put the weight on extended arms on stool. If required support is given in the beginning to transfer the weight on extended arms.

Putting weight on upper limb

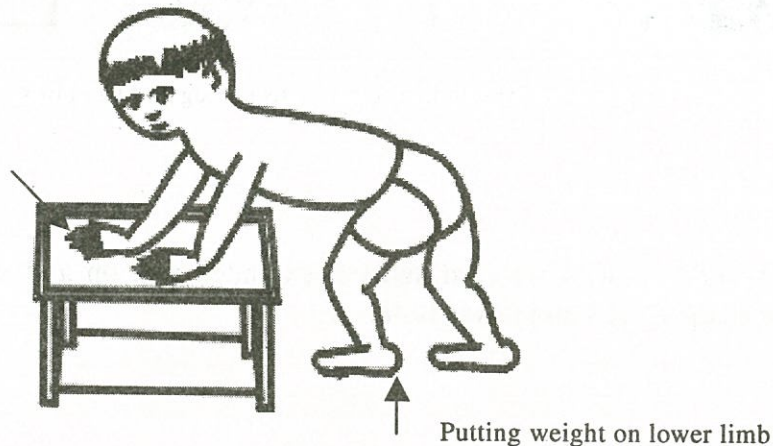


Fig. Stabilizing posture against stool

Uses

- Strengthens the muscles of upper limbs / hand.
- Develops weight bearing on extended upper limbs and lower limbs.
- Controls involuntary movements.
- Develops stability.

Weight bearing on affected leg and hand in hemiplegia⁵⁸

Purpose

Weight bearing on upper limb and lower limb on the affected side.

Introduce or reintroduce weight bearing on affected parts i.e. upper limb and lower limbs.

Instructions-1

- Put the affected upper limb extended against wall, windows or on table / stool and stand on the affected lower limb.
- Ask the child to hold same position for 5-10 minutes and 2-3 times a day.

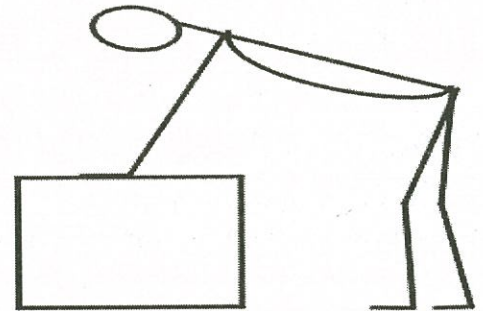


Fig. Weight bearing on affected leg and hand of same side

Instruction-2

- Ask the child to bend forward and put extended arm on a stool and transfer body weight on extended upper limb and lower limb.

Uses

- Develops weight bearing and weight transferring.
- Strengthens the muscles.
- Develops standing balance.
- Facilitates normal pattern of movements in upper limb and lower limb.

Upper limb elevation / raising

Purpose

To encourage shoulder elevation⁶⁴ and outward rotation.

Instructions

- Position yourself in a long sitting position with both legs straight.
- Place a toy at a certain height, reachable to the child.
- As you play with the child, slowly turn your legs out to the side. As your leg moves away, child will also shift his weight and reach for the toy with free upper limb.
- Later increase the height and distance so that child can raise the arm further.

Uses

- Develops eye hand coordination.
- Develops upper limb function.
- Strengthens the muscles of trunk and arm.
- Develops balance.

Desired response

Shoulder elevation will occur with outward rotation while head is up.

Undesired responses

1. Thumbs will turn down.
2. Elbows will bend.
3. The shoulder will go for internal rotation to prevent it help the child in lifting any objects as normal as possible without shoulder internal rotation⁶⁵.

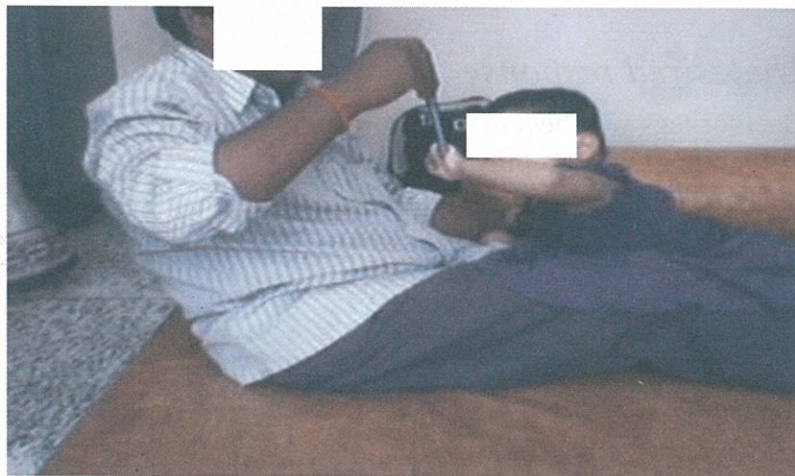


Fig. Shoulder elevation and outward rotation of arm

⁵⁹Shoulder elevation - Shoulder is moved upwards.

⁶⁰Shoulder internal rotation - the shoulder will move inward movement or rotation inside.

Reaching in prone over a roll or bolster

Purpose

To aid child in increasing strength in neck and back muscles.

Enable child to bear weight on one arm while reaching for the object with other arm.

Instructions

- Place child lying on a stomach over a roll or a pillow.
- Position yourself on the side of the child support is given at pelvis level and other arm supporting at the elbow to keep the hand straight.
- Place a toy in front of the child at a distance.
- Encourage the child to reach forward for the toy with free hand while shifting weight on other.
- Later increase the distance of toy so that child will stretch and reach for the toy.
- Repeat the same procedure for the other arm.

Uses

- Develops balance and coordination.
- Strengthen the muscles of neck, back, shoulder and arm.
- Develops head and neck control.
- Increase the range of motion in joints.
- Develops weight bearing, weight shifting and reaching.

Desired response

Child will reach out while bearing weight on one arm.

Undesired response

Back or legs will become stiff and shoulder will go internally to prevent it stabilize the knee joint and the shoulder.

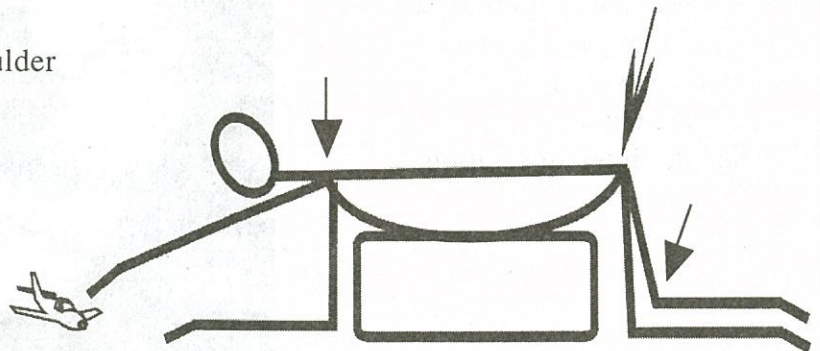


Fig. While putting weight on one extended upper limb reaching for the toy with other hand

Play over legs

Purpose

- To improve head and trunk control.
- To encourage child to bear weight on arm.
- To develop the upper limb function.

Instructions

- Position yourself in a long sitting position with legs straight and slightly bent at the knees.
- Place the child on stomach, on your legs.
- Place a toy at certain height in front of the child.
- Encourage the child to hold the toy with one arm and bear weight on other arm.
- Later place a toy at the side of the child.
- Encourage the child to play with both extended arms.

Uses

- Helps to develop upper limb functions.
- Transfer of weight from one side to other (one side of body to other).
- Helps in eye-hand coordination.
- Helps to develop head and neck control.
- Helps to develop balance and coordination.

Desired response

1. Child will hold his head up while looking at and playing with the toy.
2. Child will support body weight on one upper limb.

Undesired response

1. Child will arch the head and trunk back.
2. Legs will pull together.
3. Child will pull the arm up with elbows bent.

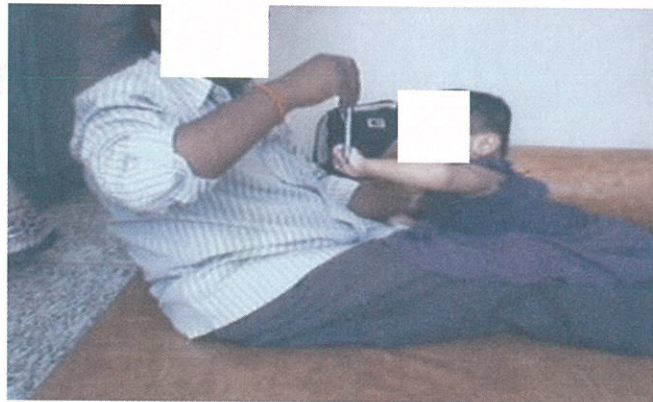


Fig. Play over legs to develop weight bearing and upper limb function

Concept of mouthing

Mouthing (means putting everything to the mouth)

Instructions

- As it is seen in normal development, that normal child puts everything to the mouth till certain age limit.
- Encourage the child to put hands, food items, safe toys into the mouth.
- Putting thumb, fingers and eatables etc. in to the mouth.
- Care should be taken that harmful, sharp objects should not be given.

Uses

- As this helps to - normalize the sensitivity⁶¹ around oral motor area.
- Develops oral motor muscles and their functions.
- Improves sucking and swallowing.

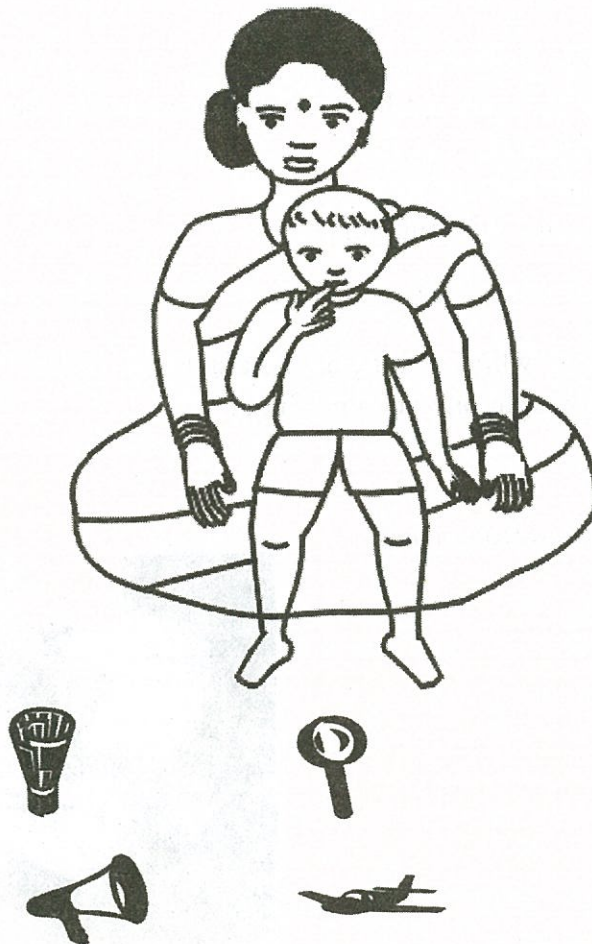


Fig. Mouthing (putting things in to mouth)

Hand to mouth

Purpose

To assist child in hand to mouth activity and later feeding.

Instructions

- Assist the child in taking hand to mouth.
- Hold the child's upper limb and take it towards his mouth.
- Initially the movement should be done by assistance and later encourage the child to do the movement by himself.

Uses

- Develops eye-hand coordination.
- Hand to mouth control.
- Improves ADL(Active Daily Living) activities and feeding activities.

Desired response

With or without your assistance, child will be able to bring hand to mouth.

Undesired response

Child will push back with shoulders or will react unpleasantly to having hand at the mouth. Child elevates the shoulder, to prevent it stabilize the shoulder, elbow and assist the movement.



Fig. Hand to mouth activity

Hands to midline(midline orientation)

Purpose

To develop midline orientation⁶².

Instructions

- This can be done either in sitting or lying position.
- Ask the child to bring both hands towards midline of the body and take it away from the midline of body.
- Keep toy in front of him and encourage him to take it with both hands.

Uses

- To develop midline orientation.
- Eye hand coordination.
- Awareness of his own body parts.
- Helps to develop upper limb functions.

Desired response

Child will be able to play with hands at midline; child will become more aware of own hands and will actively begin to bring hands together.

Undesired response

Child will push backwards with shoulders or head. Child may extend one limb towards the face side and other limb may in flexed or bend.

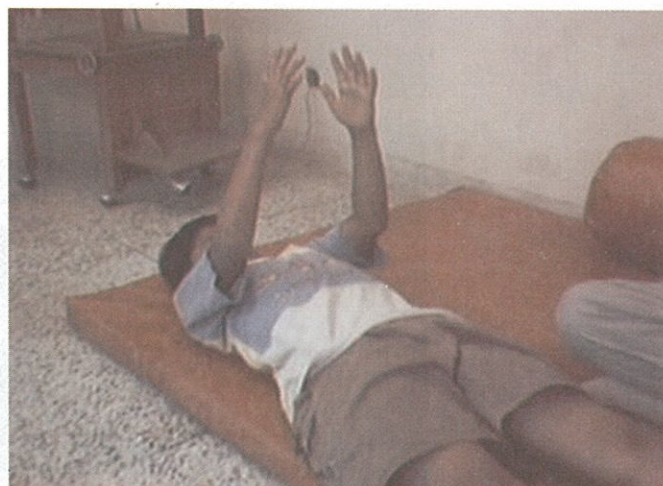


Fig. Midline orientation of upper limbs in sitting and lying.

Bilateral reaching⁶³ while prone over roll / bolster

Purpose

To encourage reaching with both hands and to strengthen the shoulder girdle and trunk muscles.

Instructions

- Put the child on stomach over a roll or a ball.
- Place yourself on the back of the child or at the sides.
- Hold the child at the hips.
- Place a toy in front of the child at a reachable distance.
- Encourage the child to reach out for the toy with both arms stretched.
- Encourage the child to stretch and reach further for the toy, which it is placed at a distance.

Uses

- Develops balance and coordination.
- Develops head and neck control.
- Strengthens arm, shoulder, neck and back muscles.
- Increase the range of motion in joints.
- Develops weight bearing, shifting and reaching.
- Helps to develop bilateral upper limb function.

Desired response

Child will be able to reach for an object with both hands.

Undesired response

Child will not be able to straighten arms completely or will lower head and rotate body in attempt to reach out special instructions.
Child will reach with internal rotation of shoulder.

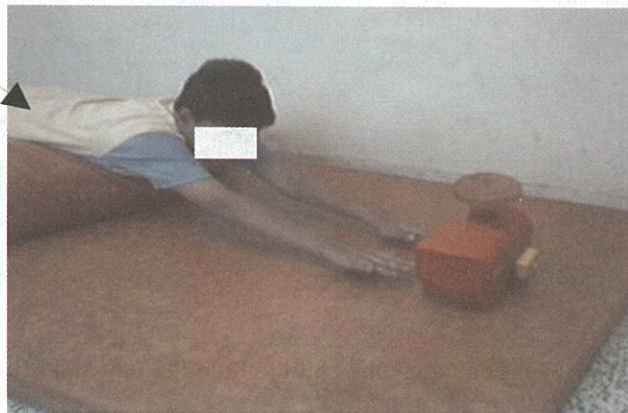


Fig. Forward reaching for the toy with both hands

⁶³Bilateral reaching - Reaching with both hands.

Hand to foot(hand to foot coordination)

Awareness about hand and body parts(hand to mouth coordination).

Instructions

- Hold the child's hand at the elbow level with one hand and take it towards eye, mouth, ankle and leg.
- Let the child observe and play with his hand and leg.
- Child will become more aware of his body.
- Hold leg with hand (catching toe with hand).

Uses

- Child develops hand and foot coordination.
- Develops eye-hand-foot coordination.
- Develops foot to mouth coordination.

Desired Response

Child will actively move both hand, foot and will become more aware of there areas of own body.

Undesired response

Child will become stiff. So at first help the child in moving the leg and hand together. We can also place any colour full objects in the leg region so that he tries on his own to touch it.



Fig. Encourage the child to hold the foot and bring it towards mouth and eye if necessary support is given.

Exercise for upper limbs and hands

Purpose

To improve upper limb and hand function.

Instructions

- Ask the child to reach in all directions like front, back, sideways, vertical or upward either with one upper limb or both upper limbs.
- Give activities such as lifting Weights, Sand bags⁶⁴, Dumbbells of various sizes.
- Pull spring with various tensions according to the capacity of the child.
- Playing with Flour dough, Mud, Sand, Ball, Cones, Clay.
- Ask the child to grasp objects of various size, shape, texture and release it.

Uses

- Strengthens the muscles of upper limb and hand.
- Develops the upper limb and hand functions.
- Develops eye-hand coordination.

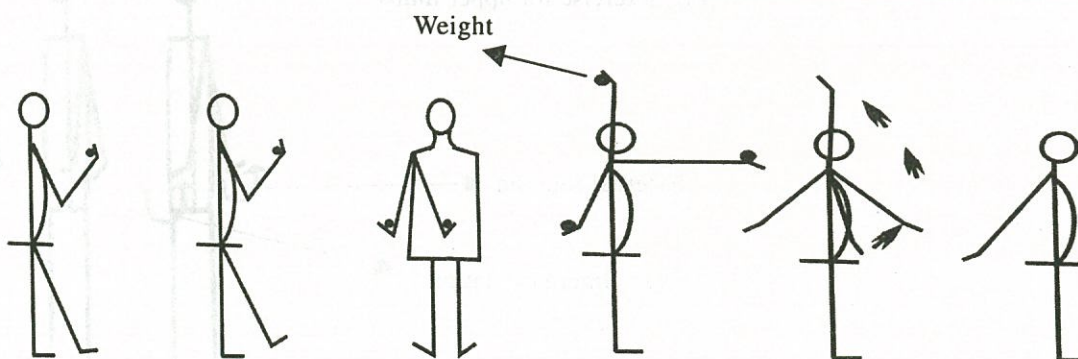
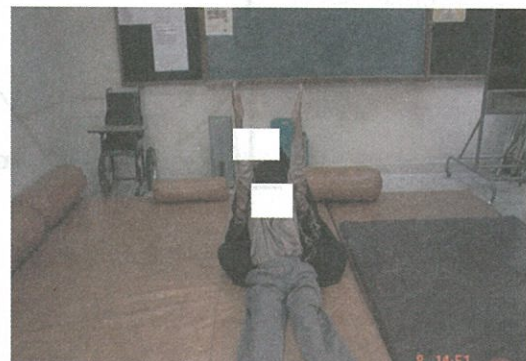
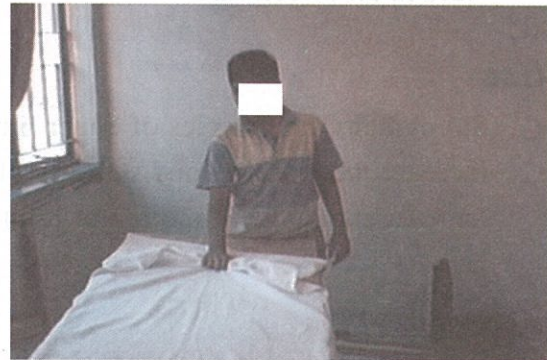


Fig. Activities for upper limb and hand

⁶⁴Sand bag - A bag with sand used for strengthening the muscles.

Exercises for the upper limbs

Purpose

To facilitate controlled voluntary movements of arms and to improve strength in upper limbs.

Instructions

- Ask the child to practice the movements of arms in various positions sitting, standing and lying.
- Activity such as taking the arm over head and bringing it down.
- Taking the arm sideways (away from the body and close to the body).
- Turning the arms in and out.
- Progression is made by asking the child to lift weights, springs, sandbags and weights of various sizes in all directions.

Uses

- Strengthens the muscles of upper limb.
- Increase the mobility and stability of the arms.
- Increase the range of motion of joints of upper limb.

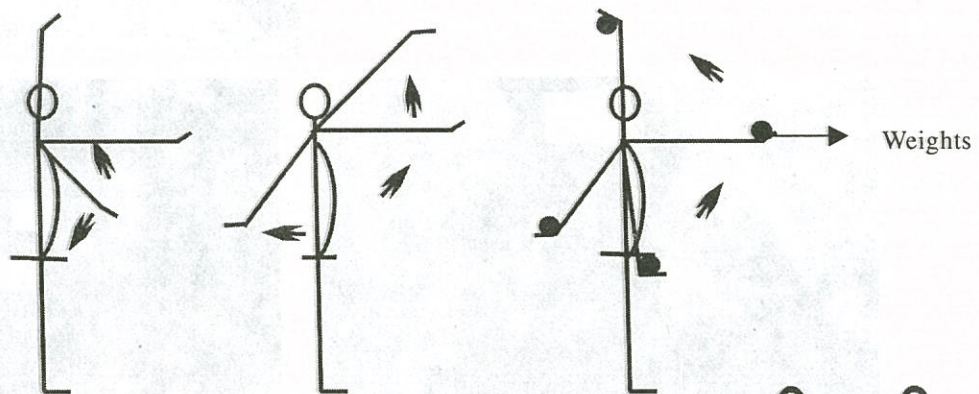
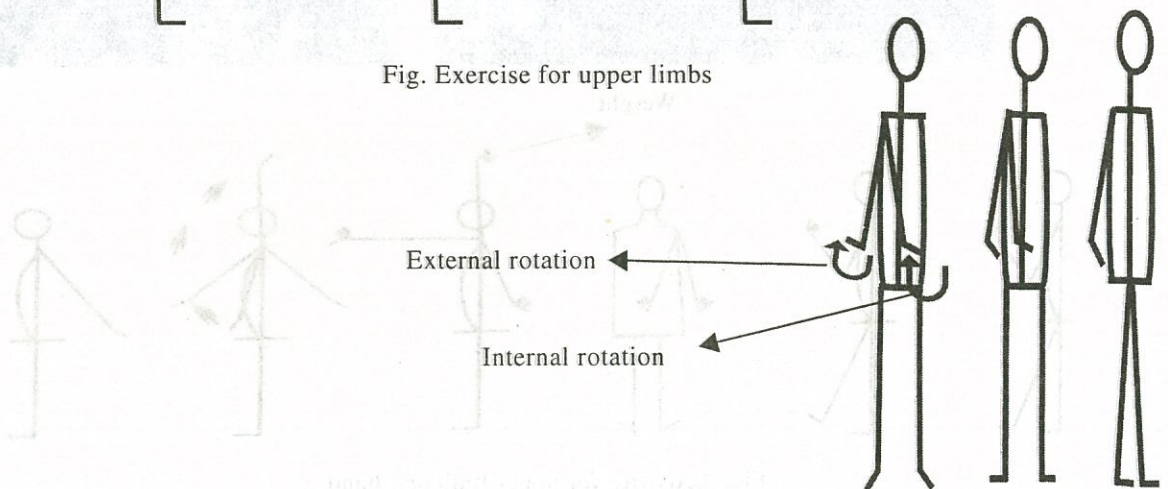


Fig. Exercise for upper limbs



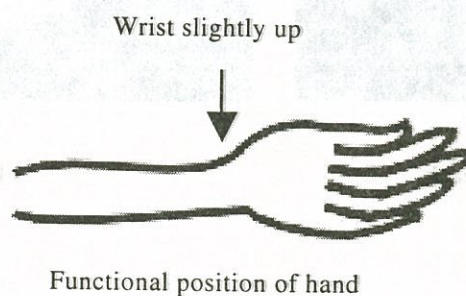
Exercises to improve hand function (To develop upper limb functions)

Instructions

- Encourage active exercises like - Pressing fingers against each other as in Namaste position.
- Playing with plastacine⁶⁵, clay, mud, atta etc.
- Resistance exercises like pulling springs, lifting dumbbell, sand bags and weights of various sizes.
- Squeezing balls of various sizes.
- Individual finger and hand exercises, pressing fingers against each other (either active / passive).
- Collecting cloth spread on the floor.
- Individual joint range of motion exercises.
- Holding chalk pieces in between thumb and individual fingers.
- Opposition movements of tip of thumb against the digits of fingers.
- Closing and parting of fingers.
- Reaching in all directions like forward, sideways, backwards, upward and vertical.
- Grasping objects of various sizes, shapes, textures by using functional position of hand.

Uses

- Develops coordination.
- Strengthens the muscles of upper limb and hand.
- Maintain / regain joint range of motion.
- Develop upper limb function / hand functions.

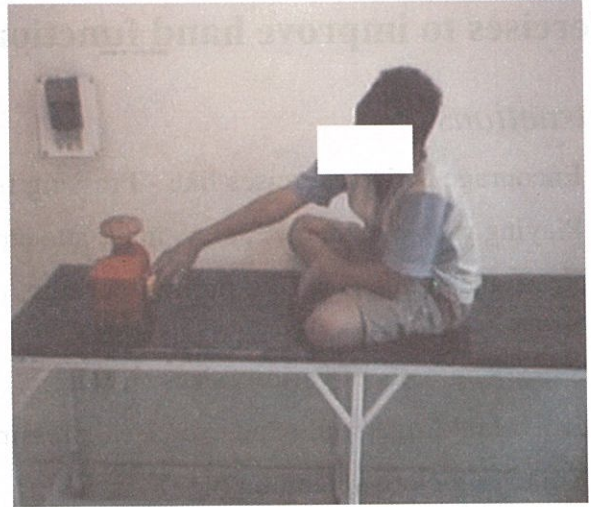


⁶⁵Plastacine - Is a device used to strengthen the hand muscles.

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Bringing hands together



Forward reach



Sideward reach



Upward reach





Touching the tip of finger against tip of thumb



Holding a toy



Lifting a toy

Exercises for coordination of eye hand movement/function

Purpose

To improve co-ordination.

Instructions

It can be eye-hand coordination, eye-foot coordination, hand to hand coordination, and hand to mouth coordination.

Eye hand coordination-

- Place the child in sitting position.
- Position yourself at the back of the child.
- Place a toy in front of the child.
- While playing with toy ask the child to follow the moving toy and catch it.

Hand to hand coordination-

- Transfer the object⁶⁶ from one hand to another. Ex. playing a ball, stroking the ball.

Hand to mouth coordination-

- Keep the eatables or toys in front of the child, ask him to put it into mouth.
- Assist the child to take eatables / toys to mouth.

Eye foot coordination-

- Ask the child to lift his legs straight and take it up.
- Follow foot.
- Ask the child to catch foot and put it into mouth.

Uses

- Develops coordination.
- Develops ADL(Activities of daily living).
- Develops the strength in the muscles of upper limb and lower limb and mobility in joints.

Fig. Hand to hand coordination



Exercises for hand

Purpose

To improve hand function.

Instructions

- Ask the child to bring his both hands close to each other.
- Press right hand fingers against left hand fingers.
- Parting and closing of fingers.

Uses

- Helps to improve the movements of fingers and hands.
- Helps to develop upper limb and hand function.
- Helps to develop muscle power and movement in hand and fingers.

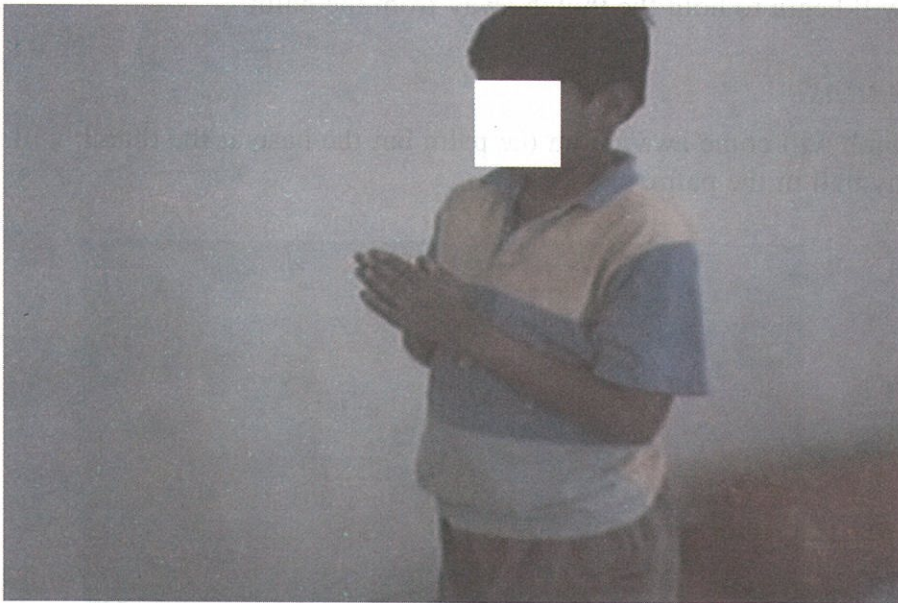


Fig. Fine movements of hands

Thumb abduction

Purpose

To encourage the child to hold hand open with the thumb away from the palm.

Instructions

- Put the child in a comfortable position.
- Slightly bend at the elbow.
- Hold the child's wrist and fingers with one hand and try to bring the thumb away from the other fingers and gently apply the stretch⁶⁷.
- Maintain the position for few seconds.
- Keep any toy or ball in the hand so that it prevent adduction of thumb.

Uses

- Increases the range of motion.
- Develop the hand functions.
- Helps in ADL(Activities of Daily Living).

Desired response

Slowly the child will begin to hold the thumb away from the palm.

Undesired response

The end of the thumb will come away from the palm but the base at the thumb will remain tight. To prevent it place any ball in the palm.



Fig. Stretching of thumb

Note : Do not pull the thumb as this may be harmful.

Chapter-11

RANGE OF MOTION EXERCISES

Procedure

Exercises are given to the child by putting one hand above the joint and other hand below the joint and move the joint in a straight line (towards the midline of joint) through its available range of motion⁶⁸.

Range of motion exercises

Uses / Advantages

- Maintain / regain the normal range of motion or as normal range of motion as possible.
- To prevent or correct the contractures⁶⁹ and deformities⁷⁰.
- Maintain or correct the joint alignment.
- Prevents joint stiffness.
- Maintain the properties of muscles like elasticity, extensibility⁷¹, contractibility⁷² etc.
- To maintain or increase blood circulation, nutrition and metabolic changes.
- To train the pattern of movement.
- To maintain tone and bulk of muscle.

Indications of Range of Motion exercises

- Range of motion exercises are given when the person is not able to move his joint fully or if the range of motion is restricted due to injury, sprain, tightness, stiffness, muscle weakness.
- Inactivity.
- Non use of his body.
- Due to any associated physical problem.
- Unable to move limbs freely.
- Due to contractures and deformities.
- Due to abnormal muscle tone.
- Abnormal pattern of movements etc.

⁶⁸Range of motion - Is the degree of movement allowed by any joint.

⁶⁹Contractures - It is the tightness in a muscle.

⁷⁰Deformities - There are muscular changes and bony changes which are irreversible.

⁷¹Extensibility - It is the relaxation of muscles.

⁷²Contractibility - It is the shortening of the muscle.

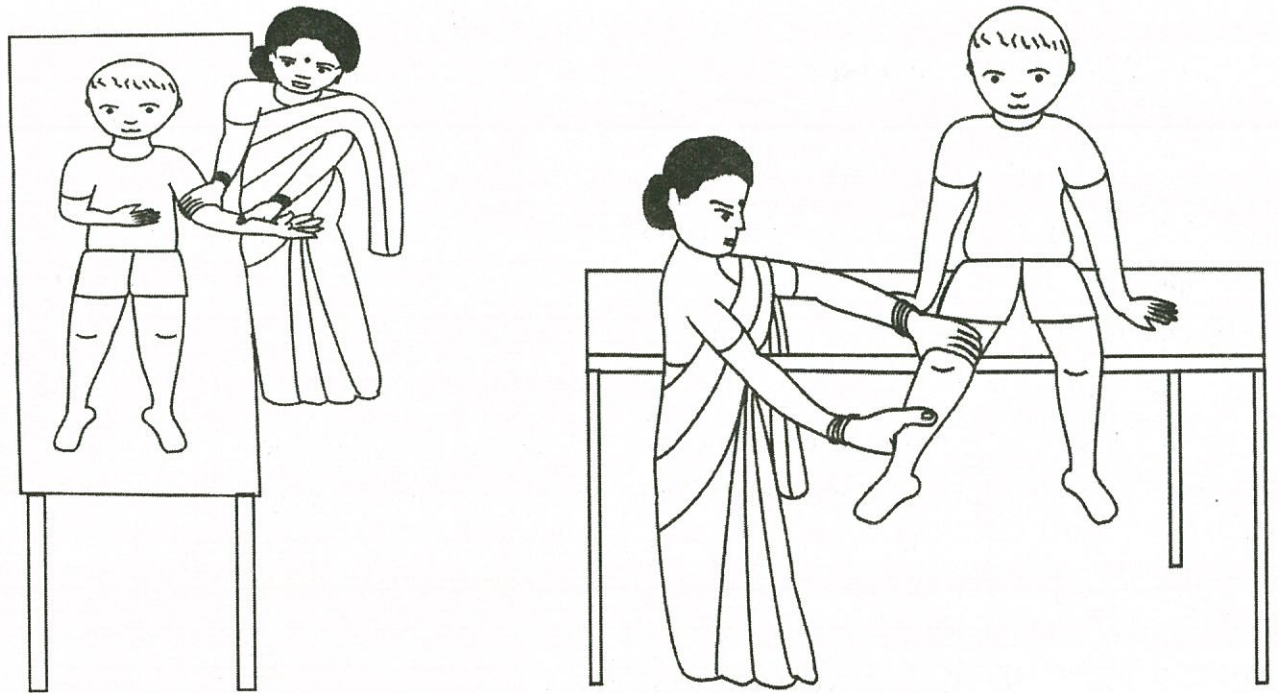


Fig. Range of motion exercises for hands and legs.

Shoulder joint

Instructions

- Place the child in a comfortable lying position(on back).
- Position yourself next to the child.
- Put one hand above the shoulder joint and other hand at the wrist.
- Gently move the arm straight upwards and bring the arm downwards to the starting position(flexion-extension).
- Move the arm away from midline and then towards midline(abduction-adduction).
- Slightly bend at the elbow and move the forearm into inward and outwards (internal-external rotations).
- Take the arm / joints into available range of motion(2-3 times a day, 5-10 repetitions per session) and gradually increase the joint range of movement to gain / regain normal range of motion or as normal as possible.

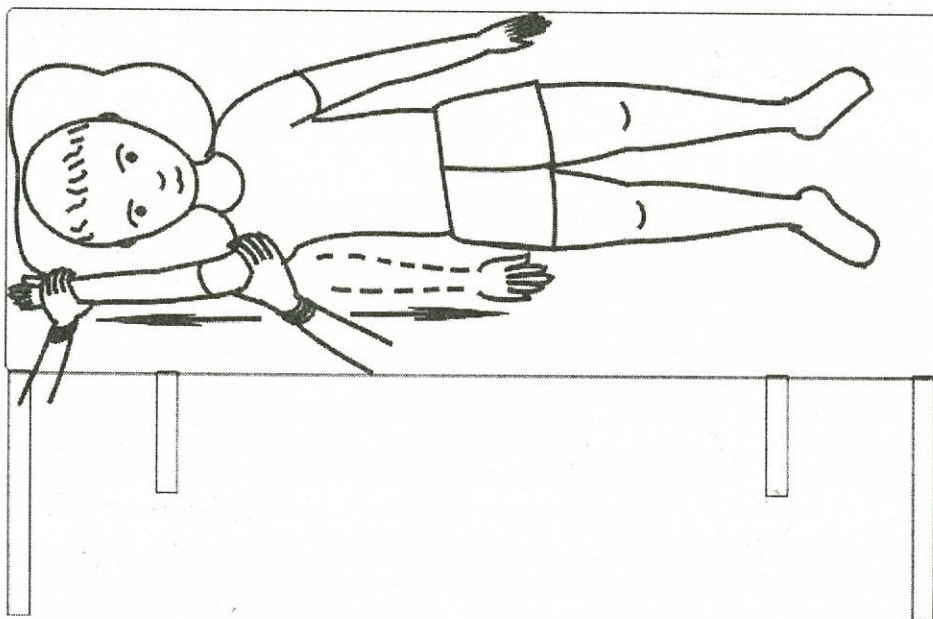


Fig. 1 Shoulder flexion - extension

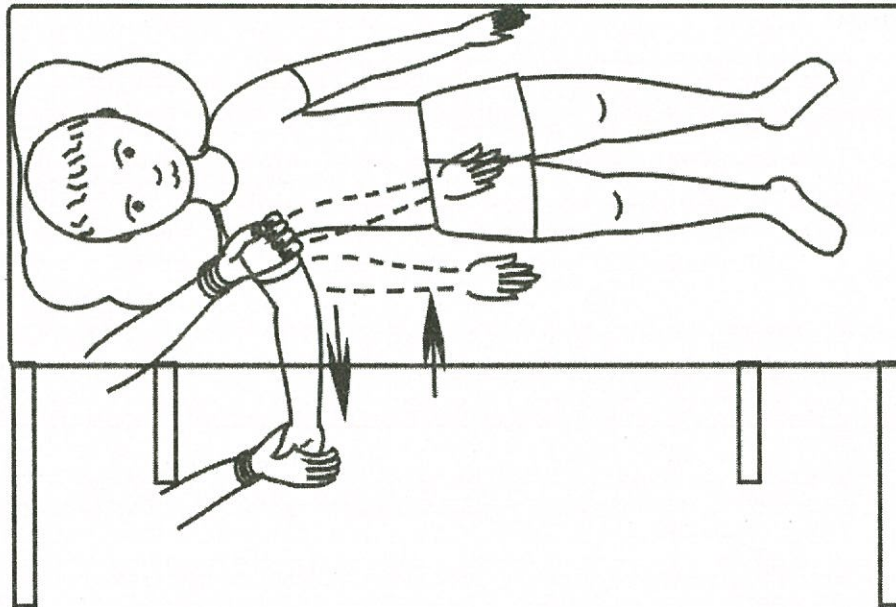
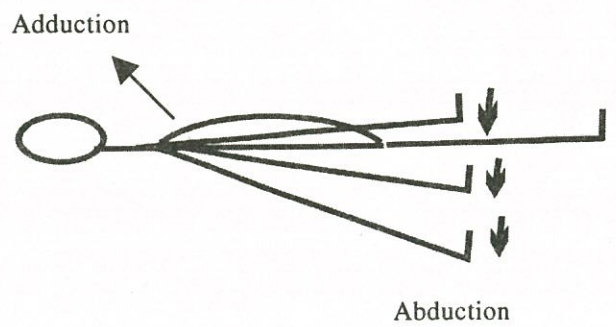
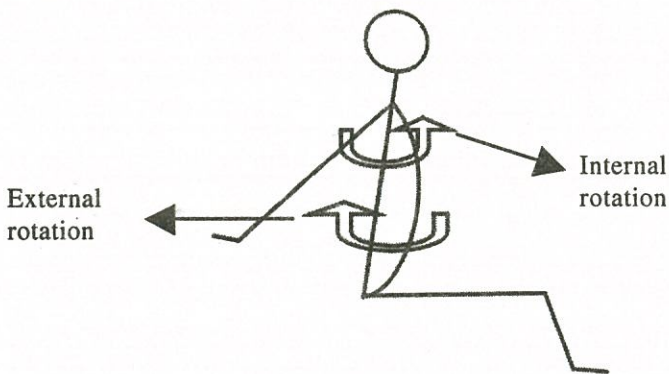
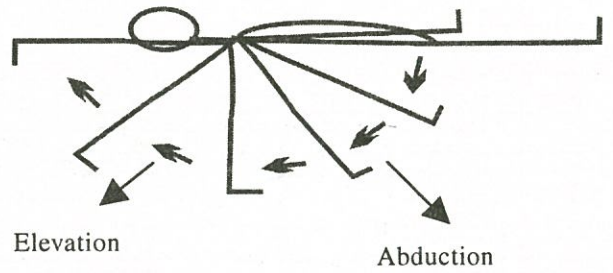
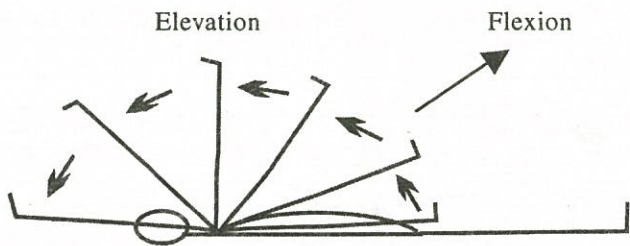


Fig. 2 Shoulder abduction - adduction



Shoulder flexion and extension

Instructions

- This position can be done in three ways sitting, standing and lying.
- Put one hand just above the shoulder joint and other at the wrist while keeping the elbow straight and move in all directions within available range of motion.
- Encourage the child to move the upper limb straight upwards and downwards by his own.
- If needed parents can assist the movement by holding one hand at the shoulder and other at the wrist.

Uses

- Helps to gain movement in shoulder joint if range of motion restricted / limited.
- Strengthen the muscles around the shoulder joint.
- Improve the range of motion and stability of the shoulder joint.

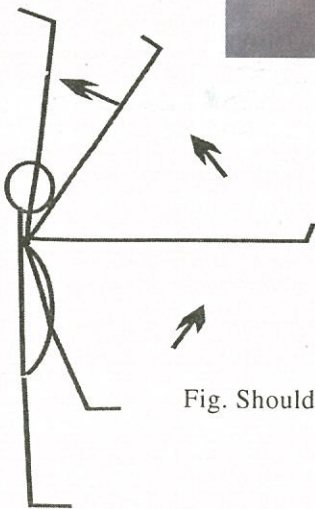


Fig. Shoulder flexion

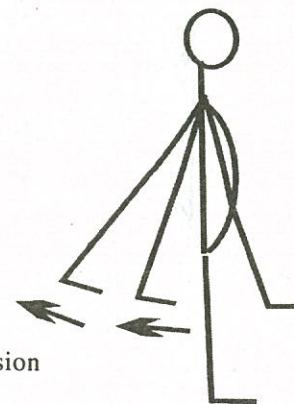


Fig. Shoulder extension

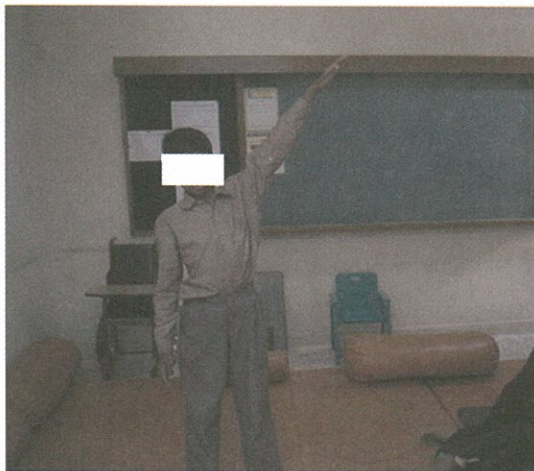
Shoulder abduction and adduction

Instructions

- This movement can be done in three positions : sitting, standing and lying.
- Put one hand above the shoulder joint and other at the wrist.
- Encourage the child to move the upper limb sideways, outside and inside of the body by his own.

Uses

- To gain the range of motion of shoulder joint, if restricted /limited.
- Helps in the mobilization⁷³ of shoulder joint.
- Strengthen the muscles of shoulder joint.
- Improve the range of motion of shoulder joint.



Elevation

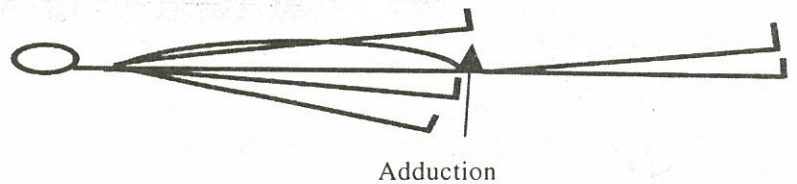
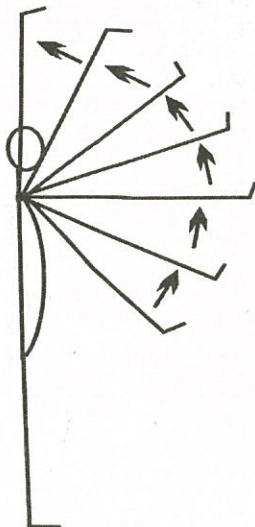


Fig. Shoulder abduction

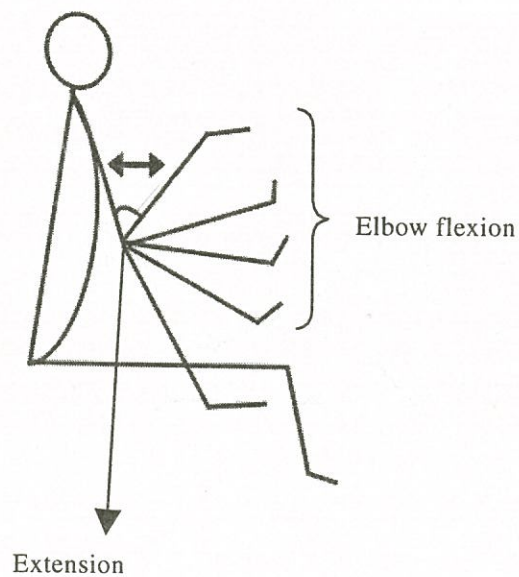
Elbow joint

Instructions

- Place a child in a comfortable position.
- Position yourself next to the child.
- Put one hand just above the elbow and the other hand above the wrist.
- Move the forearm in a upward and downward directions (flexion-extension).
- Perform the movement smoothly and rhythmically 2-3 times a day, 5-10 repetitions per session and gradually increase the joint range of motion, and compare it with normal.



Fig. Elbow flexion - extension



Wrist joint

Instructions

- Place the child in a comfortable position.
- Position yourself next to the child.
- Put one hand above the wrist and other below the wrist joint.
- Move the wrist to upward and downward directions(flexion-extension) and side-to-side(ulnar deviation-radial deviation). (Towards thumb and towards little fingers).
- Take the wrist into a available range of movement, gradually increase it and bring the range of motion to normal.
- Perform the motions smoothly and rhythmically 2-3 times a day, 5-10 repetitions per session.

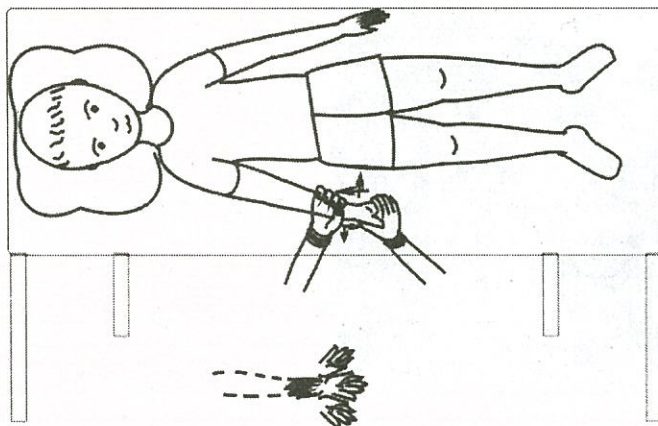
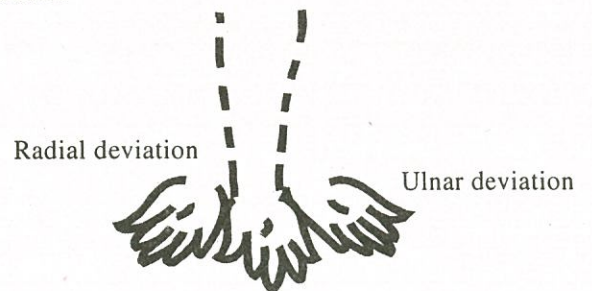
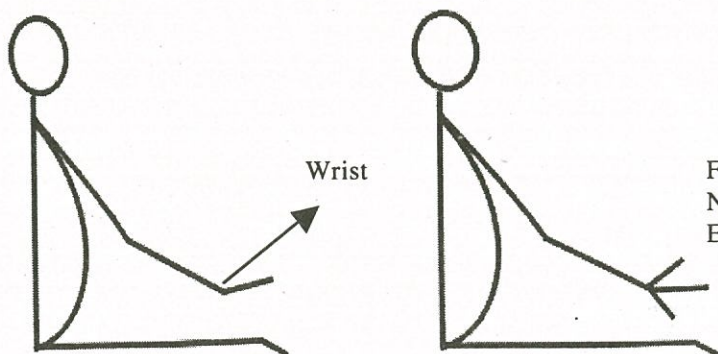


Fig. Wrist flexion - extension
Ulnar deviation - Radial deviation



Hip joint

Instructions

- Place the child in a comfortable lying position.
- Position yourself next to the child.
- Put one hand above the knee and other above the ankle joint.
- Bend the hip, knee and foot and make it straight (flexion-extension) and away from midline and towards midline (abduction-adduction).
- Lift the lower limb straight upwards without bending knee / foot.
- Rotate the leg inside and outside the body towards midline and away from midline (internal-external rotation).
- Perform the motions 2-3 times in a day, 5-10 repetitions per session and gradually bring it back to normal.

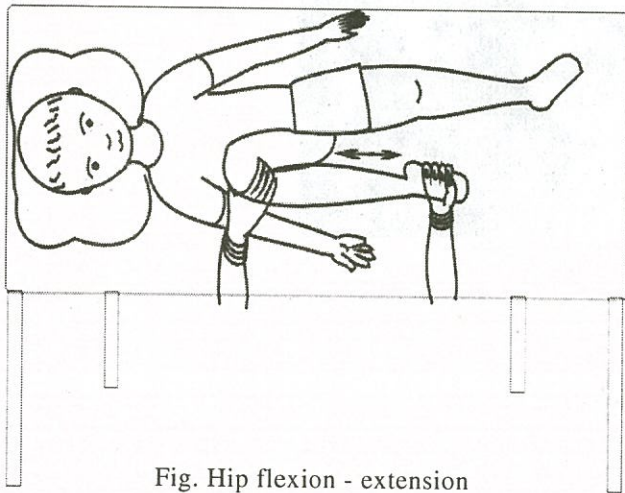


Fig. Hip flexion - extension
Knee flexion - extension

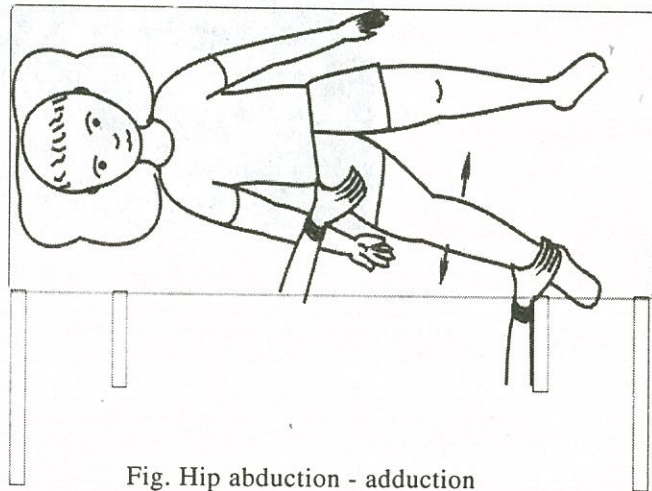
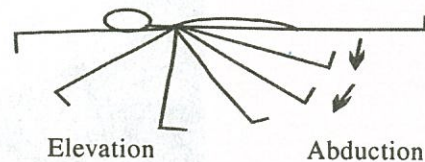
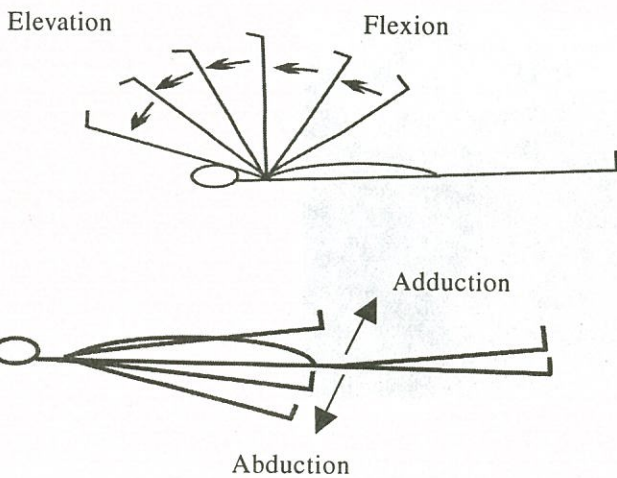


Fig. Hip abduction - adduction



Abduction and adduction of legs in supine and side lying

Instructions -1

- Place the child in supine or side lying position.
- Place your hands on sides of the knee joint and take legs away from midline / near to midline.
- The child has to move the legs outwards and inwards by his own.
- Parents can assist the movement by holding one hand at the hip and other at the ankle.



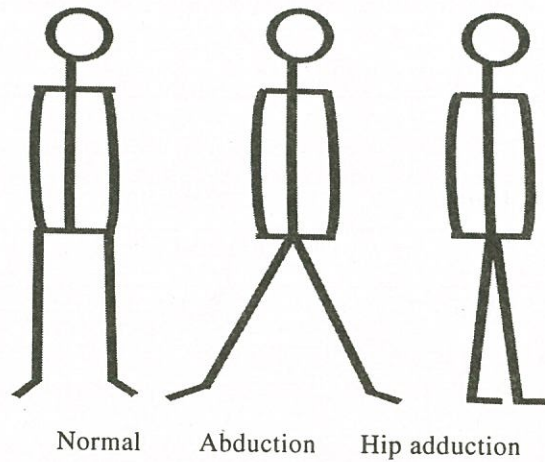
Instructions -2

- In side lying position ask the child to move one leg away from the other and bring close to each other.
- Parents can assist the movement.



Uses

- Increase the range of motion.
- Strengthens the muscles.
- Develops the stability and mobility of the joints.
- Reduce the tightness and assist in keeping the legs away from each other and later stages helps in standing and walking.



Knee joint

Instructions

- Place the child in a comfortable sitting position on table.
- Position yourself next to the child.
- Put one hand above the knee joint and other hand above the ankle or foot.
- Bend the knee and make it straight.
- Perform the motions smoothly and rhythmically, 5-10 repetitions per session and 2-3 times a day.

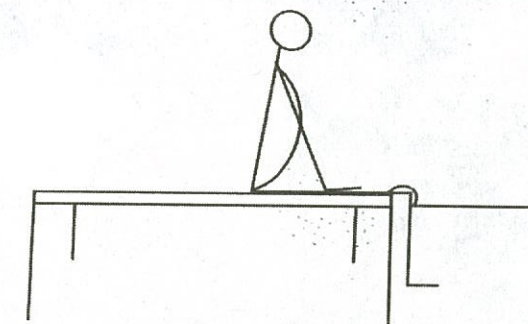
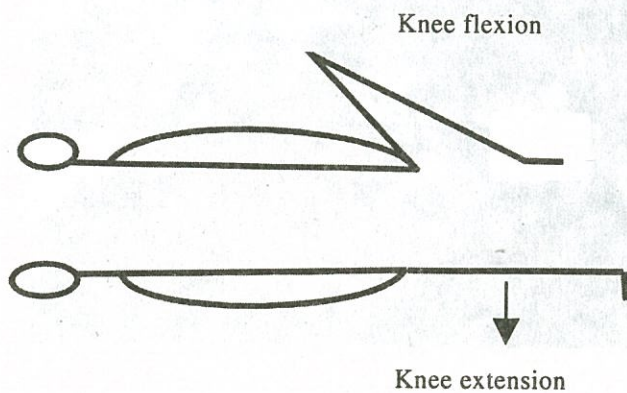


Fig. Knee flexion-extension



Dorsiflexion⁷⁴ with knee extension (side lying)

Purpose

To help the child learn to put foot up while the knee is straight.

Instructions

- Place the child in side lying or supine with knee straight.
- Hold one hand at the knee joint and other at the foot. While holding the knee joint straight, move the foot up and repeat it 5-10 times.

Uses

- Helps to maintain proper alignment of the legs.
- Prevent or corrects deformity at the ankle.
- Later stages it helps in standing and walking.

Note :

Most of the children develops plantar flexion of foot(foot facing downwards at the ankle joint).

Desired response

The foot will pull up either when you are rubbing or when child reaches for the toy.

Undesired responses

The child will pull away from you or bend the knee. So stabilize the knee with your hand and do the movement of the foot.



Fig. Side lying with knee straight and dorsiflexion at the ankle

Ankle joint

Instructions

- Place the child in a comfortable position.
- Position yourself next to the child.
- Put one hand just above the ankle and other hand below ankle or near toes.
- Move the ankle into upward and downward directions (Dorsi-plantar flexion), and sideways into (inversion-eversion):
- Take the ankle into available range of movement and gradually bring the movement to normal or as normal as possible.
- Perform the motions smoothly and rhythmically at least 2-3 times in a day, 5-10 repetitions per session.

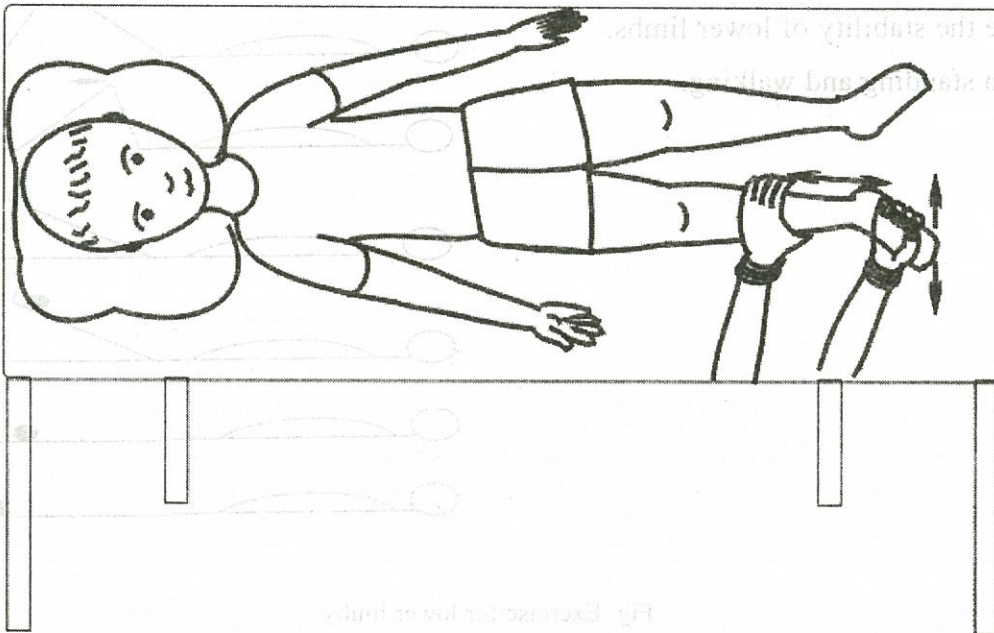


Fig. Ankle dorsiflexion - plantar flexion inversion -eversion

Exercises for lower limbs

Purpose

To facilitate active movements of legs.

Instructions

- Ask the child to lift lower limb straight and bring it back to normal.
- Ask the child to bend hip, knee/ankle and make it straight.
- Turning the legs in and out sides.
- Take lower limb away from midline and towards normal.
- Add weight or springs and sandbags at lower limbs and ask the child to do all exercises.

Uses

- Strengthens the muscles of legs.
- Increase the range of motion.
- Increase the stability of lower limbs.
- Helps in standing and walking.

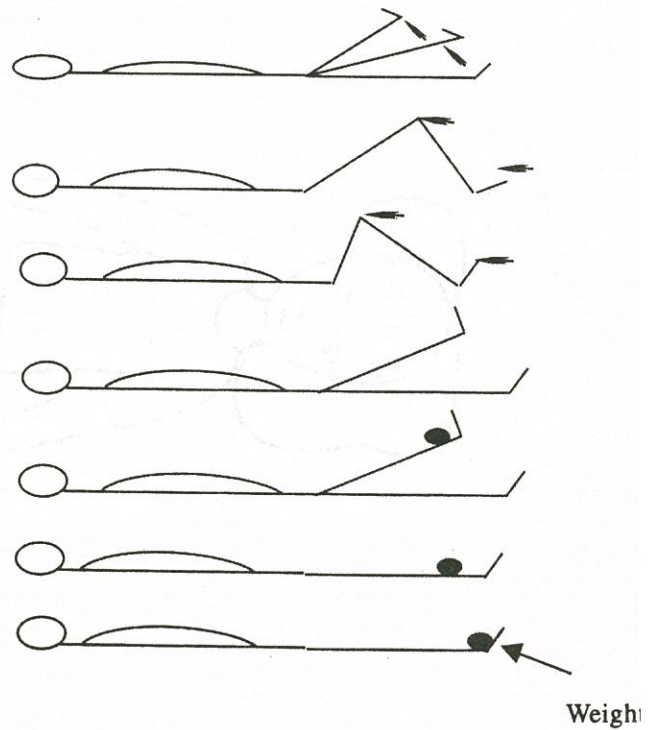
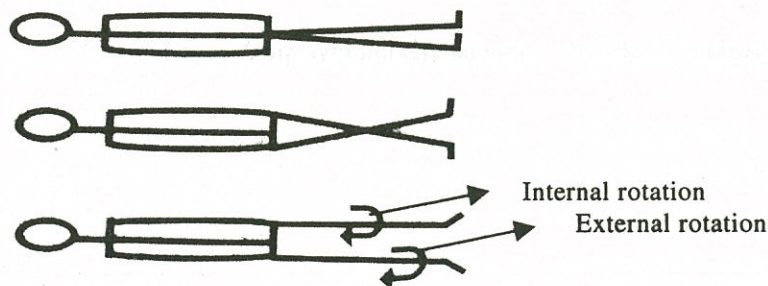


Fig. Exercise for lower limbs



Chapter-12

STRETCHING

Technique designed to lengthen the shortened soft tissues⁷⁵ and joints.

- Range of motion is limited as a result of tightness of soft tissues, structural bony obstructions, spasticity and scar tissue formation leading to shortening of muscles, these factor may interfere with contractures / deformities of daily living activities.

Effects of stretching

- To improve normal range of motion of joints.
- To prevent tightness in the muscles.
- To prevent or correct the contractures and deformities.

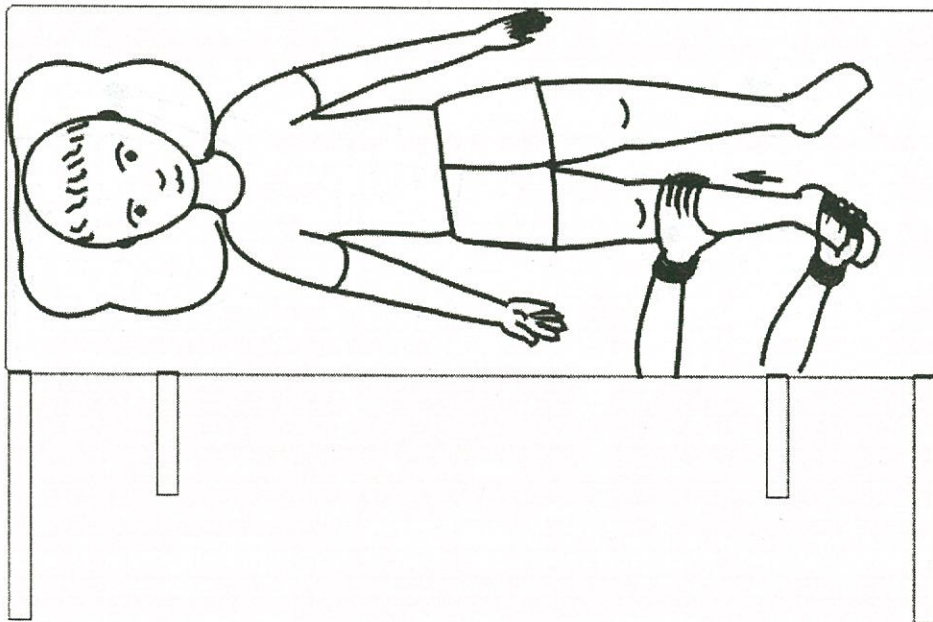


Fig. Passive stretching

⁷⁵Soft tissues - Muscles, Ligments etc.

Tightness of leg muscles (calf) toes faces down

Purpose

To prevent equinus⁷⁶ deformity or to prevent tightness of the calf muscle (equinus deformity means foot position is downward, person walks on toes).

Instructions

- Place the child in a comfortable position.
- Place yourself on the side of the child.
- Put one hand on the knee and other hand on the foot including heel.
- Bend the hip and knee and foot in upward direction.
- Gently move ankle in upward direction (dorsiflexion) and apply the stretch force (up and down movements).
- Slowly bring the same leg downwards, and put it on ground and apply the force on knee towards ankle maintain the stretch force at the ankle.
- Each stretching should be done for 5-10 times per session.
- Weight bearing also stretches the tight calf muscles when the child is standing.

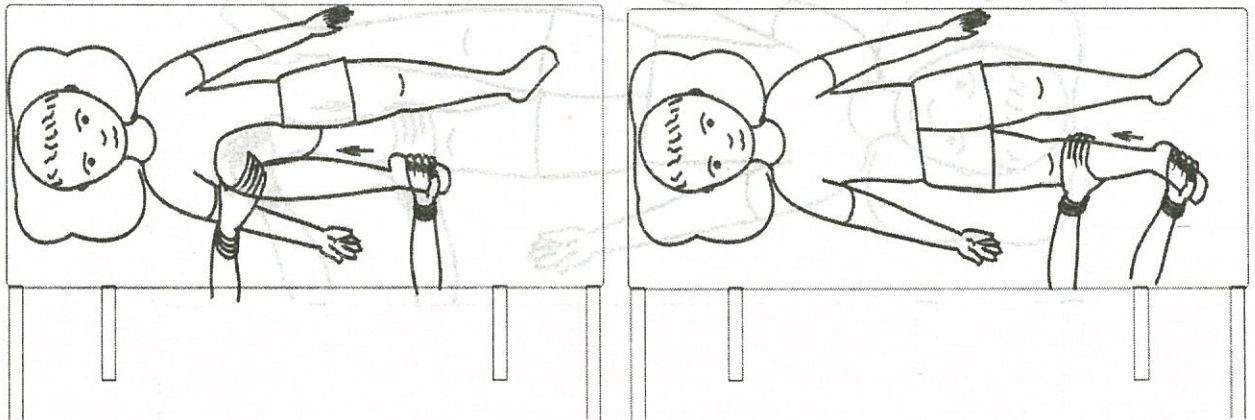
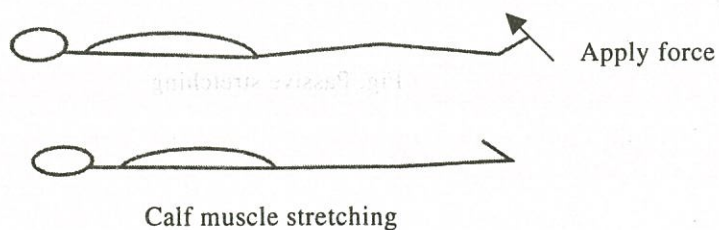


Fig. Stretching calf muscle



Note : It is advisable to dorsiflex the foot with the knee in flexion. Then straighten the knee gradually maintaining while dorsiflexion.

Exercises for foot deformities

Purpose

To correct deformities of foot.

Instructions

- Place the child in a comfortable position.
- Position yourself next to the child.
- Put one hand at foot and other hand just above the ankle.
- Gently turn the foot outside and inside.
- Hold the foot in stretch position for 10-15 seconds and release.
- Each stretching should be done for 5-10 times per session.
- Special shoe can be recommended to maintain, prevent or correct foot deformities (arch developing shoes). According to the nature of the foot deformities. Special shoe can be made.
- Following exercises help to prevent or correct foot deformities.
 1. Walking in sand pit or narrow beam.
 2. Walking on rough terrain.
 3. Standing on toes.
 4. Standing on heel.
 5. Standing on outer border of foot.
 6. Standing on inner border of foot.

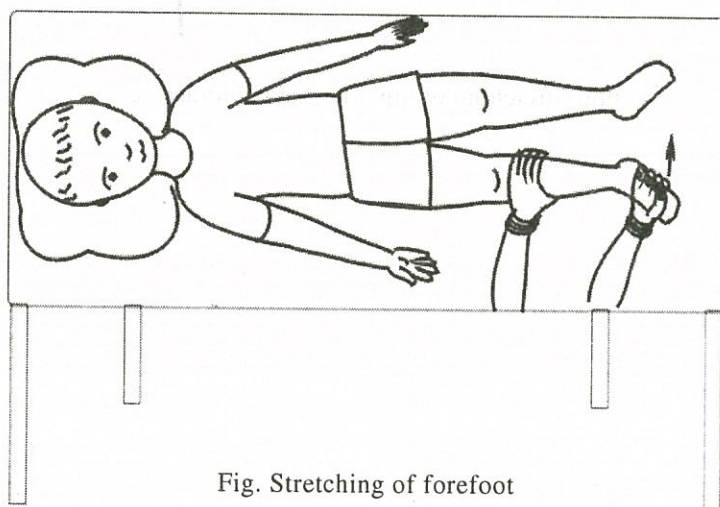


Fig. Stretching of forefoot

Stretching of hip, knee flexion, contracture

Instructions

- Place the child in a prone position.
- Put sand bags on hip, knee and ankle joint.
- Apply force at hip, knee and ankle joint.

Uses

- It helps to prevent and correct contractures and deformities at hip, knee and ankle joint.
- It helps to stretch the hip and knee flexion contracture.
- Regains functional movement at hip and knee joint.

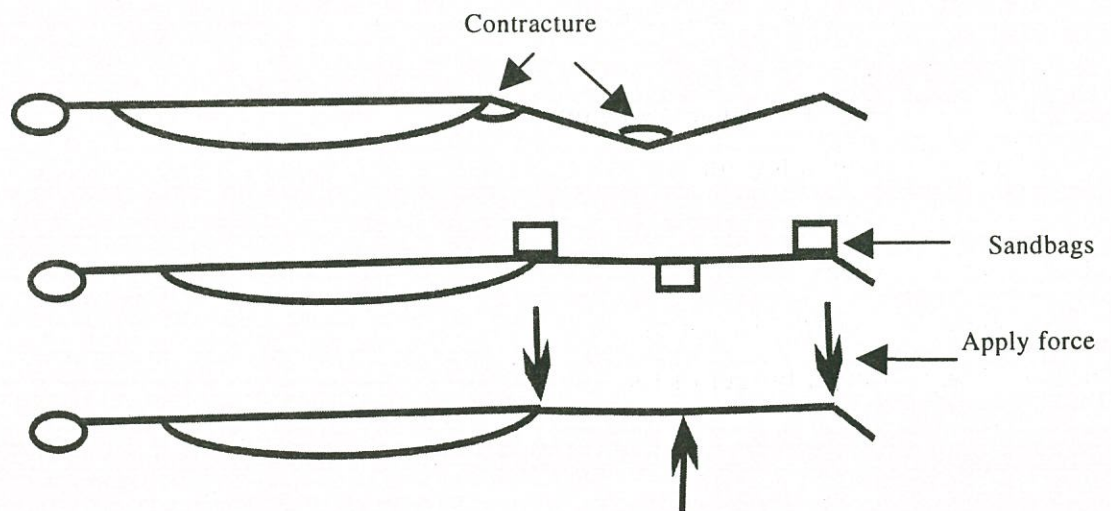


Fig. Stretching of hip, knee and contracture

Stretching the hamstrings (back muscles of thigh)

Purpose

To prevent knee flexion deformity or to prevent tightness in hamstring muscles(back muscles of thigh).

Instructions

- Place the child in a comfortable supine position.
- Position yourself next to the child.
- Put one hand on the knee joint and the other at the back of the foot.
- Apply force at knee joint(downward) and ankle(upward).
- Take the leg into straight upwards and apply the stretch force at the knee and other at ankle.
- Maintain the stretch force and gradually bring the leg back to neutral position.
- Maintain the stretch for 10-15 seconds and 5-10 times per session.

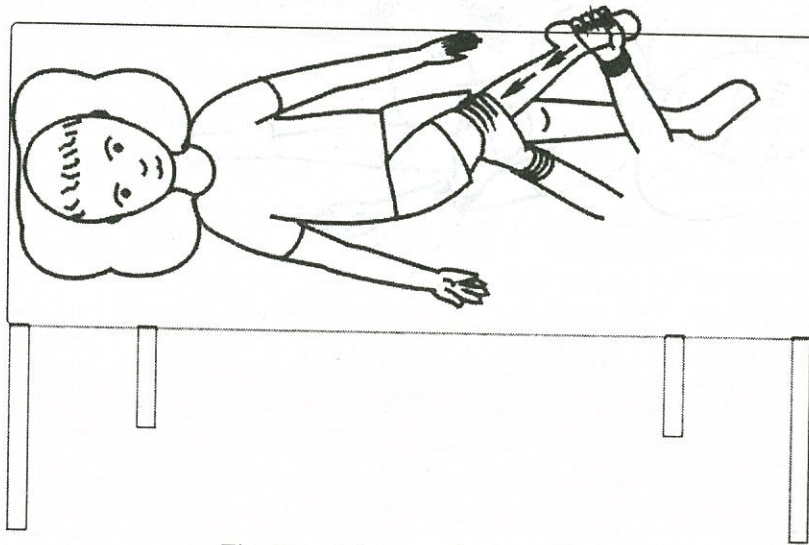


Fig. Hamstring muscle stretching

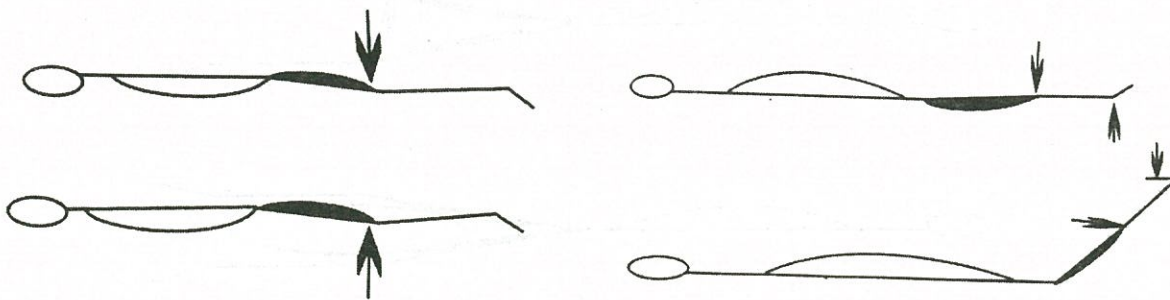


Fig. Stretching hamstring muscle

Adductor⁷⁷ stretching

Purpose

To prevent scissoring of legs or tightness in the muscles of thigh.

Instructions

- Place the child in a comfortable position.
- Position yourself facing the child.
- Put sand bags and pillows in between thighs.
- Put your both hands on inner side of the child's both knees and separate the knees take away from each other and apply the stretch force for 10-15 seconds.
- Each stretching should be done for 5-10 times per session.
- Give night splints that inhibit adductor spasms⁷⁸.

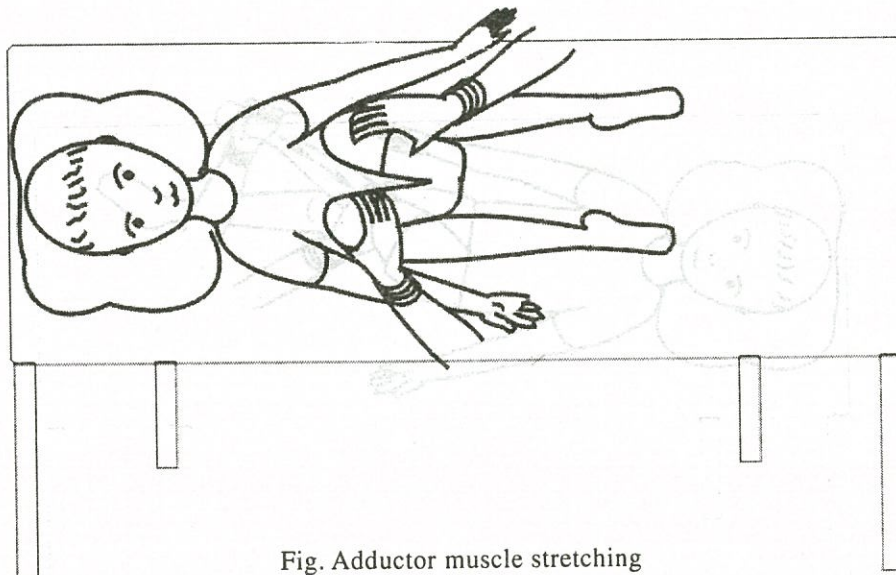


Fig. Adductor muscle stretching

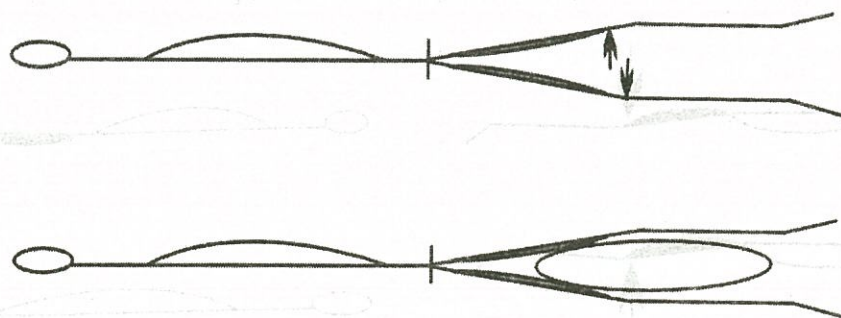


Fig. Adductor muscle stretching

⁷⁷Adductor - Are the muscles which lie in the between middle part of the thigh.

⁷⁸Spasms - It is protective tightness in muscles.

Stretching of hip flexion contracture (tightness)

Instructions

- Put the child in prone position lying on stomach foot outside the bed.
- Position yourself on the side of the child.
- Put sand bag at hip and knee.
- Put your one hand over the pelvis and other at the ankle.
- Apply the stretch at hip, knee and ankle.
- Maintain the stretch force for 10-15 seconds.
- Each stretch should be done for 5-10 times per session.

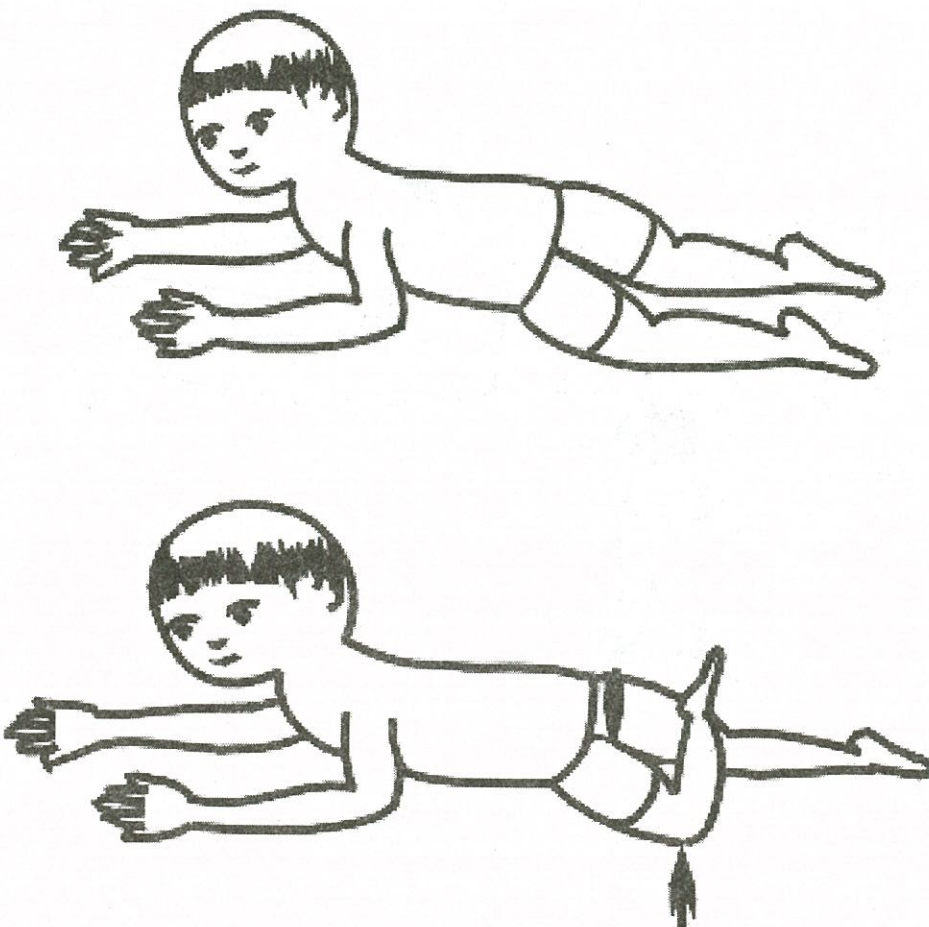


Fig. Stretching of hip flexion contracture

Biceps stretching

Purpose

To prevent flexion deformity at the elbow or to prevent the tightness in muscles situated in front part of arm.

Instructions

- Place the child in a comfortable position.
- Position yourself on the side of the child.
- Put one hand above elbow and other hand below elbow / wrist.
- Move the elbow in a front and back direction.
- Stretch the elbow.
- Each stretching should be done for 5-10 times per session.

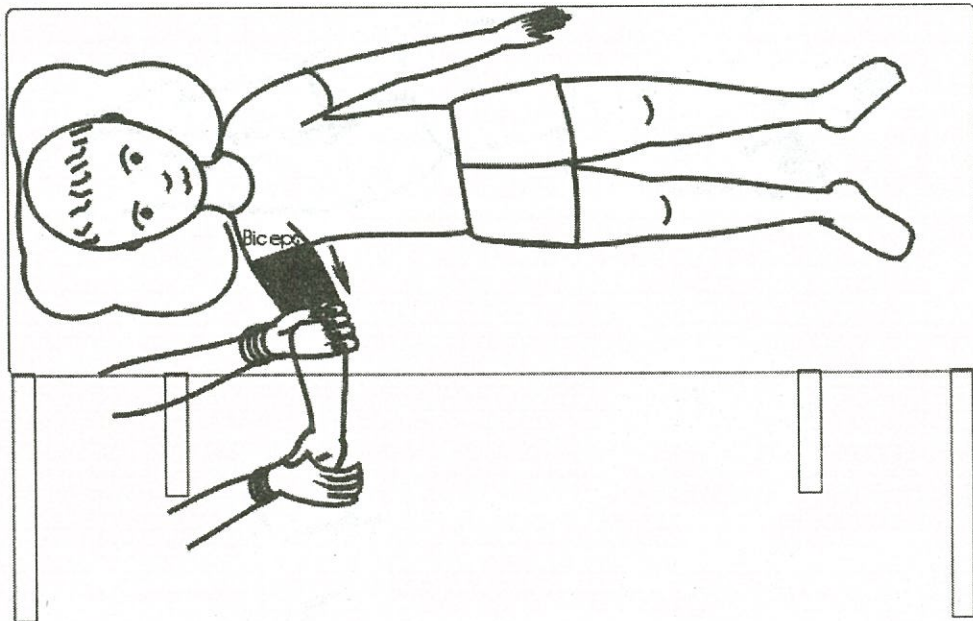


Fig. Stretching biceps muscle

Forearm stretching

Purpose

To prevent pronation⁷⁹ deformity (palm and forearm facing ground).

Instructions

- Place the child in comfortable position.
- Place yourself next to the child.
- Put one hand just above the elbow and other at the wrist (palm).
- Now slowly turn the forearm, wrist and fingers till the palm of hand faces upwards.
- Apply the force at the forearm and the wrist.
- Maintain the position for nearly 10-15 seconds.
- Repeat it for 5-10 times per session.

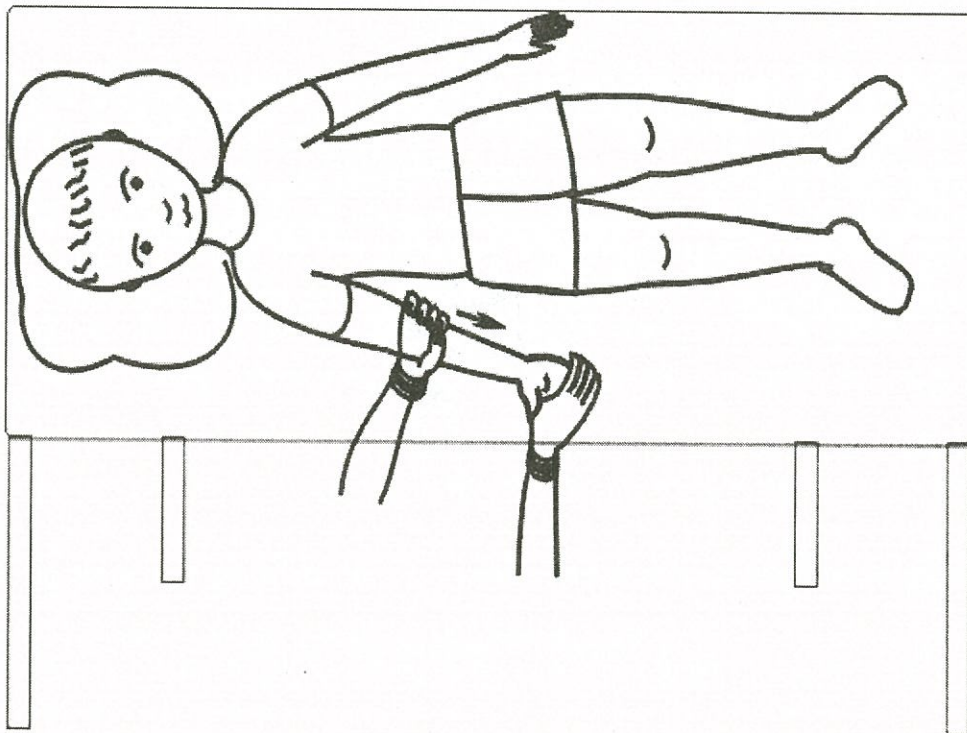


Fig. Stretching of forearm

⁷⁹Pronation - The palm will face down words.

Stretching exercises to wrist

Purpose

To prevent or correct flexion deformity at wrist.

Instructions

- Place the child in a comfortable position.
- Place yourself next to the child.
- Put one hand just above the wrist and other hand below the wrist.
- Apply stretch on wrist (up, down and sideways).
- Maintain the stretch force at the wrist for 5-10 seconds.
- Each stretching should be done for 5-10 times per session.

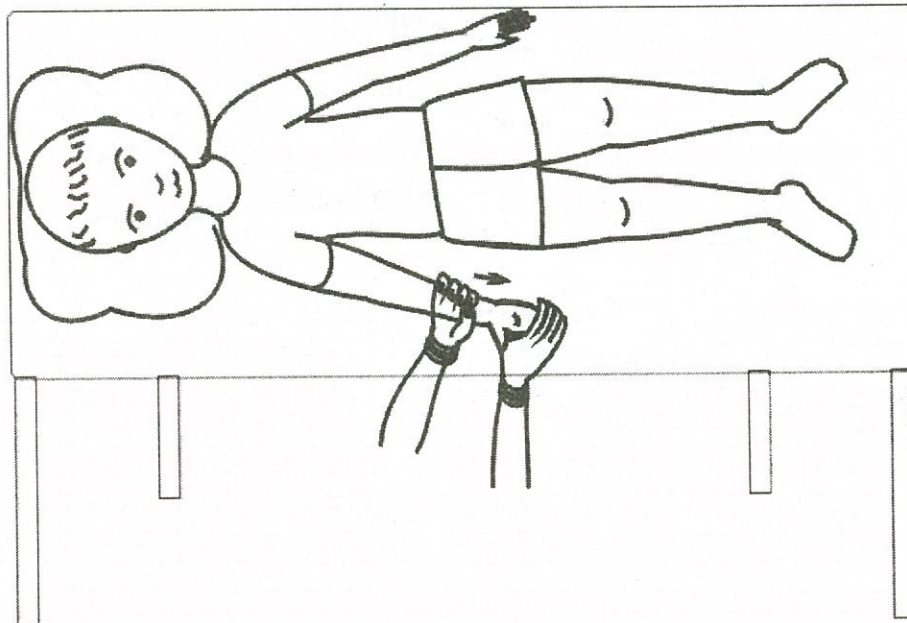


Fig. Stretching wrist joint

Stretching Sternocleido mastoid (side muscles of neck) wry neck deformity (it is commonly seen among young children)

Purpose

To stretch tight muscles of neck (that is not allowing the child to move head freely).

Instructions-1

- Place the child on a bed in comfortable position (with head out of the edge of table).
- Put your one hand at the back of the head and other at the chin.
- If one side of the muscle is tight then extend the neck then opposite side flexion and same side rotation.
- Repeat the stretching for 5-10 times per session.

Instructions-2

- To maintain the stretching effect(correction) cervical collar(specialized) is advisable.

Uses

- To prevent or correct the head and neck deformity.
- To prevent or correct the tightness in the neck.
- To maintain or gain joint range of motion of neck.

Desired response

The right muscle should gradually loosen so the head can be moved without any resistance.



Fig. 1 Passive stretching



Fig. 2 Active stretching

Chapter-13

USES OF PHYSIOTHERAPY EQUIPMENT

Activities on physio ball or any round and movable object in prone and sitting positions

Purpose

To develop weight bearing on upper limbs and lower limbs and righting reaction.

Instructions

- Place child on stomach lying on a ball with head facing down and sitting.
- Position yourself next to the child.
- Hold the child at the hips.
- Place a toy in front of the ball.
- Move the child in front and back in such a way that child should face gravity and extend the upper limbs to touch the ground.
- In backward direction child should touch the legs on ground.
- These activities can be done on any round and moveable objects(round pillows, bolsters etc).

Uses

- To develop weight bearing on upper limb and lower limbs.
- To develop neck and trunk control and balance.
- Helps in relaxation of body.
- To develop the supporting reaction of upper and lower limbs.
- Bouncing effect.

Desired response

Child will place both hands on floor.
Child will reach for toy with one hand.

Undesired response

Child's arms will become stiff or child will not reach with arms. So to decrease the stiffness slowly give rocking movement of the ball this will decrease stiffness slowly.

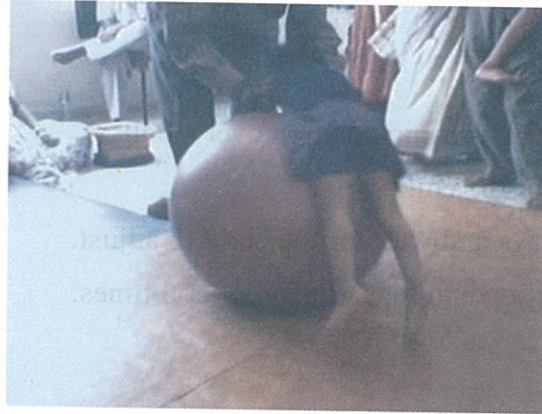


Fig. Moving the child to backward leg touching on ground

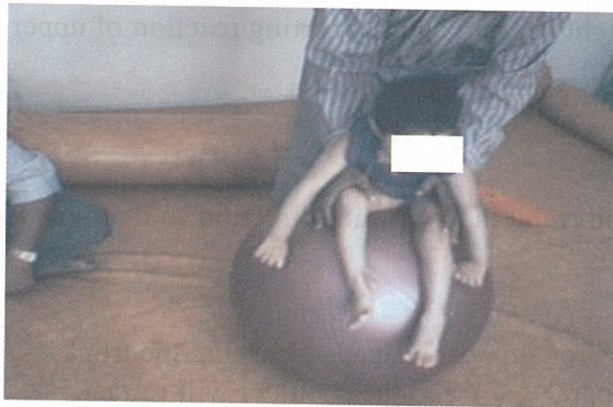


Fig. Moving the child to forward and backward directions in sitting

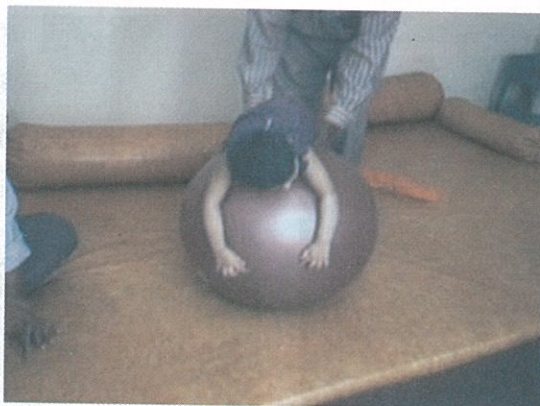


Fig. Moving the child to forward directions with upper limbs touching the ground.

Tilting sideways's on ball

(Round object like bolster / round pillows)

Purpose

To encourage lateral (side) trunk movement.

Instructions

- Place child on stomach or in a sitting position over a ball.
- Position yourself on side of the child.
- Slowly roll the ball sideways and wait for the child to adjust.
- Bring back to neutral position and repeat it for several times.

Uses

- Develops balance and coordination.
- Strengthens muscles of trunk / mobility of trunk.
- Develops unilateral weight bearing and supporting reaction of upper limbs.
- Vestibular stimulation⁸⁰.

Desired response

The child will move head and trunk in an upward direction so that you will see a curve in the trunk.

Undesired response

1. The child will use hands for support instead of curving the trunk.
2. The head and trunk will arch back and the shoulder will retract.
3. The trunk will not adjust to the tilt.



Fig. Tilting sideways on ball (lying on stomach and sitting)

Tilting sideway's on roll or bolster

Purpose

To encourage protective extension reactions of the arms.

Instructions

- Place child on stomach, lying parallel to the length of the roll or ball.
- Position yourself at the back or side of the child.
- Hold the child's leg.
- Slowly tilt the child and roll sideways on both sides.
- Repeat it for few seconds and bring back to neutral position.
- Initially with support and later without support.

Uses

- Helps to develop unilateral weight bearing.
- Child learns to maintain or regain balance.
- Helps to develop protective extension reactions of upper limbs.
- Strengthens upper and lower limb muscles.
- Learn turning to the side.

Desired response

The child will support self and hands at the end of the movement.

Undesired responses

1. Child will become stiff than straighten.
2. Arms will bend rather.

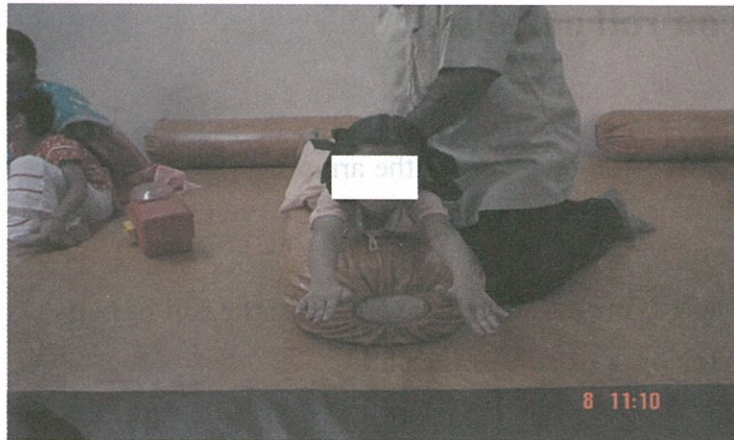


Fig. Starting position

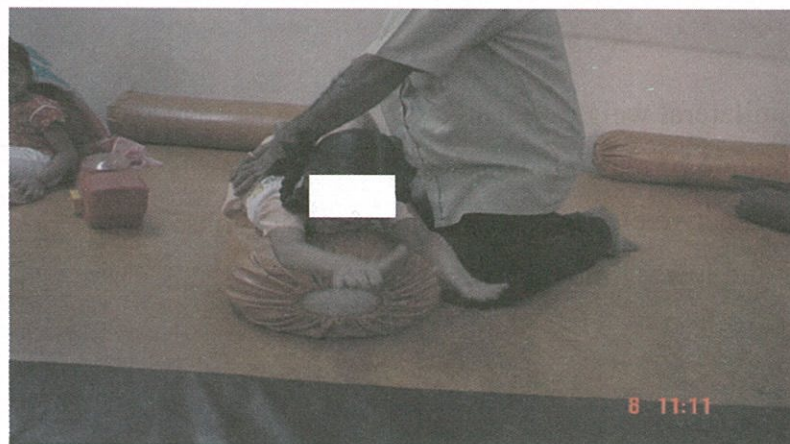


Fig. Tilting to right side



Fig. Tilting to left side

Bouncing / jumping on roll, mattress or on bolster or trampoline. Walking on Bolster(forward and sideways's)

Purpose

Bouncing will help the child to develop balance reaction.

Muscle strengthening exercises.

Sensory and motor stimuli to stimulate deep sensory receptors(proprioceptors).

Instructions

- Ask the child to stand and jump on bolster, mattress or pillows or trampoline, balance beam and balance board.
- Position yourself on back of the child.
- Support is given at pelvis level to prevent him from falling down.
- Encourage the child to walk on bolster or movable objects, initially with support and later without support.
- Care should be taken so that no sharp object, were placed near to the child.
- Surrounding area should be protected with soft mattress so that the child should not hurt.

Uses

- Develops balance and coordination.
- Develops protective reactions of upper limb and lower limbs.
- Strengthens the muscles of lower limbs, trunk and arms.
- Develops mobility in lower limbs joints.

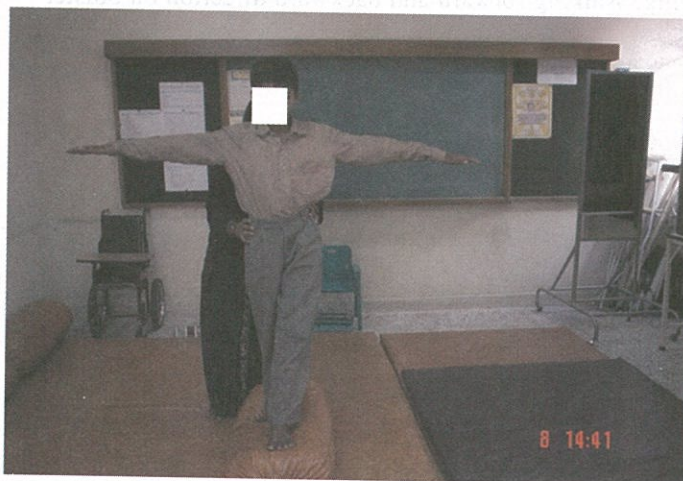


Fig. Balancing on bolster

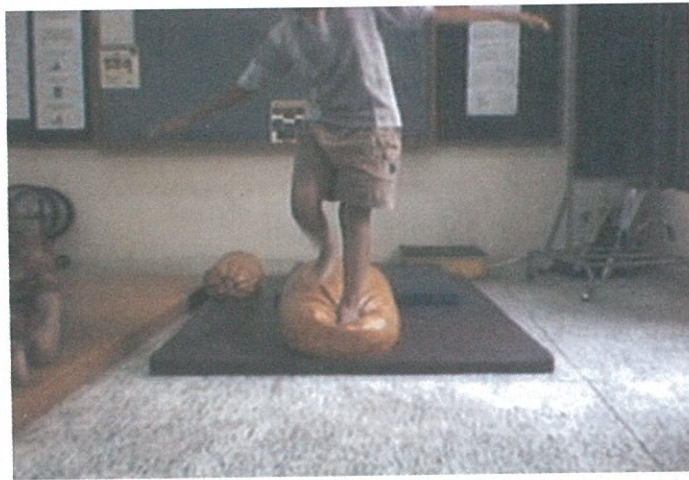


Fig. Forward walking on bolster

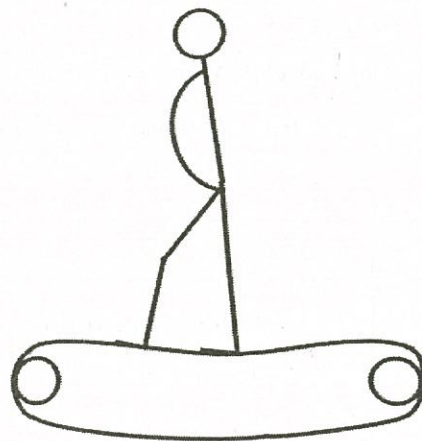


Fig. Walking forward and backward direction on bolster

Chapter-14

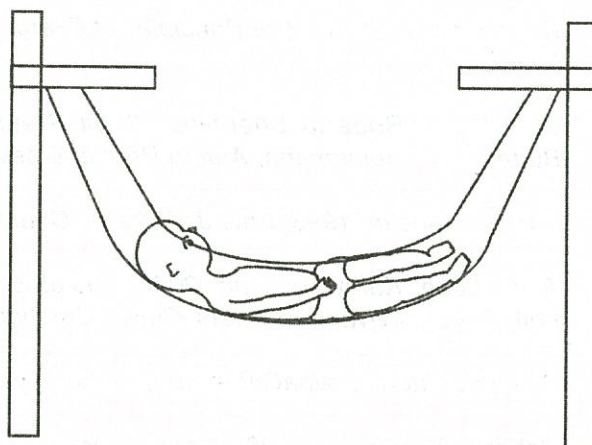
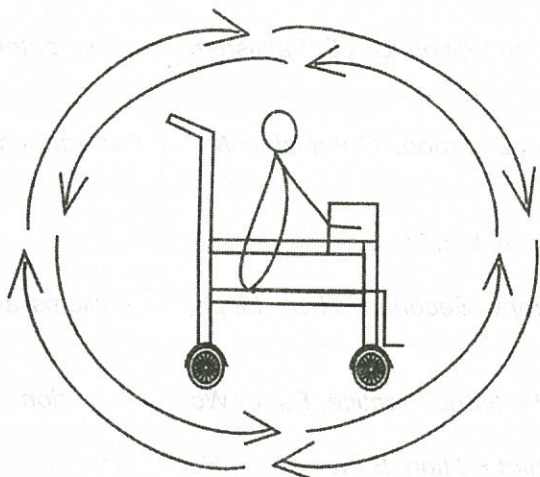
EXERCISES TO STIMULATE VESTIBULAR SYSTEM

Instructions

- Put the child in a cradle, swing, Rocking chair, Trampoline⁸¹
- Use of revolving chair.
- Put the child in revolving chair and move it clockwise and anticlockwise direction.
- Hold the child in your lap either in sitting or lying position.
- Move the child clockwise and anticlockwise direction.

Uses

- Helps to stimulate vestibular system.
- Helps to develop coordination.
- Helps to develop righting, balance and equilibrium⁸⁷ reaction.



⁸¹Righting, Balance, Equilibrium - These are the reaction which are developed when we give rocking movement.

REFERENCES

- Ford and Duckworth, 1987, *Physical Management for the Quadriplegic Patient, Second Edition*, Library of Congress Cataloging-in-Publication Data.
- Deborah Mills, Carole Fraser, 1988, *Therapeutic activities for the upper limb*, British library cataloging in publication Data, Southampton.
- Ann. H. Downer, 1988, *Physical therapy procedures Selected Techniques, Forth Edition*, Library of congress Cataloging-in-Publication Data, United States of America, Susan Edwards, 2004.
- *Neurological Physiotherapy, a problem solving approach, Second Edition*, Susan Edwards, Churchill, Livingston, Edinburgh.
- Colby L.A., Kisner. C, 1989, *Therapeutic exercise foundation and techniques, volume eight*, F.A. Davis company, Philadelphia.
- Janet.H. Carr, Roberta. B. Shepherd, 1982, *A motor Relearning Programme for stroke*, William, Heinemanr Medical Books, Cordon.
- Otho. D. Dayton, 1989, *Manual of Physical therapy*, Otto.D.Dayton, Richard.P.Di, Fabio, Stanley V. Paris Elizabeth. J. Protas, Ann.F. Vansant, Churchill, Living Stone.
- Gardiner. M.D., 1985, *The Principles of Exercise therapy, Forth Edition*, C.B.S. Publishers and Distributors New Delhi.
- Janet Carr, Roberta Shepherd, 2004, *Neurological Rehabilitation, Optimizing Motor Performance* ButterWorth-Heinemann, Ann In Print of Elsevier, Edinburgh.
- Irma. J. Wilhelm, 1993, *Irme.J. Wilhelm*, Churchill Living Stone, London.
- To by Long, Kathy Toscano, 2002, *Pediatric Physical therapy, Second Edition*, Lippincott Williams an Wilkins Pennsylvania, Wolters Kluwer Company.
- David Scrutton, MoynaGitbertson, 1975, *Physiotherapy in Pediatric Practice*, Butter Worth Correction.
- Roberta B. shepherd, 1995, *Physiotherapy in Pediatrics, Third Edition*, Butter worth, Heinemann.
- Suzann K. Campbell, 1984, *Pediatric Neurologic Physical therapy, second Edition*, Churchill Livingstone New York.
- Ann Thomson, Alison Skinner, Joan Piercy, 1996, *Tidy's Physiotherapy 12th Edition*, Varghese Publishin house, Mumbai, Butter Worth- Heinemann.
- John.V. Basmajian, Steven.L. Wolf, 1984, *Therapeutic exercises, Fifth edition*, Williams and Wilkins, U.S.A
- Stephen. M. Ordet. Leonard. S. Grand, 1992, *Dynamics of Clinical Rehabilitation exercises*, Williams an Wilkins Maryland, U.S.A.
- Whittle. M. W., 1991, *Gait Analysis an Introduction, Second Edition*, Butter-Worth, Heinemann, Oxford.
- Micheal. E. Cranford, Ron Mendell, 1987, *Therapeutic Recreational and Adapted Physical activities ft Mentally Retarded individuals*, Prentice-Hall New Jersey.

- John. V. Basmajian, Rich nyberg, 1993, *Rational Manual therapies*. Williams and Wilkins, Maryland, U.S.A.
- Hanson, M.J. & Harris, S.R(1986). *Teaching the young child with motor delays: A guide for parents and professionals*. Austin, TX: Pro-Ed, Inc.
- Ada,L. & Canning, C,(Eds,) (1990) *Physically handicapped children. An atlas for teachers*. New York: Grune & Stratton.
- Campbell, S.K.(1991) *Pediatrics neurologic physical therapy*. New York: Churchill Livingstone.
- Finnie, N.R.(1987) *Handling the young cerebral palsied child at home(US Edition)*. New York: Penguin Books USA Inc.
- Gardiner,.M.D.(1985) *The principles of exercise therapy*. Delhi: CBS Publishers & Distributors.
- Shepard, R.B.(1987) *Physiotherapy in paediatrics (2nd edition)*. London: William Heinmann.
- Thomson, A., Skinner, A. & Piercy J. (1991) *Tidy's physiotherapy(Twelfth edition)*. Oxford: Butterworth Heinemann Ltd.
- S. Sunder, 2002, *Text book of Rehabilitation, Second edition*. Jaypee Brother's Medical Publishers (p) Ltd. India.
- Jayant Joshi, Prakash Kotwal, 1999, *Essentials of orthopaedics and applied physiotherapy, First edition*, B.I. Churchill Living stone Pvt. Ltd, New Delhi.
- Ford and Duck WORTH, 1987, *Physical Management for the Quadriplegic patient, second edition*, carol Hussery, B.F.A, USA.
- SUSAN EDWARDS, 2002, *Neurological physiotherapy - a problem solving approach, second eiditon*, Churchill Livingstone, Edinburg.
- R.N. Goel, 2000, *Goel's physiotherapy volume - I, Shubham publication, Bhopal*.
- Archie Hinchcliffe, 2003, *children with cerebral palsy. A manual for therapists, parents and community workers, First edition*, Vistaar Publications, New Delhi.
- A Mervyn Fox, 2003, *An Introduction to Neuro - Developmental Disorders of Children, First edition*, The National Trust.



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