Saber Abu Mosa

(OCCUPATIONAL THERAPIST)

Hand function and equipment's

Co-funded by the Erasmus+ Programme of the European Union

Major functions of hand

1. Reaching
2. Grasping
3. Transporting
4. Release

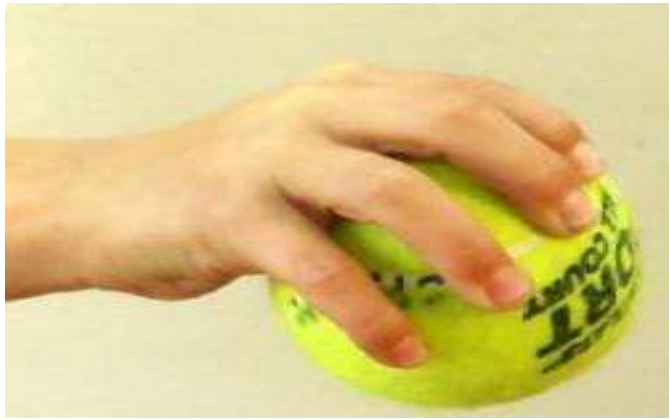
• Object manipulation is the main outcome of the function of the hand. Among all these functions, reaching and transporting are done with the arm and forearm. Whereas grasping and releasing are done entirely by hand.

Co-funded by the Erasmus+ Programme of the European Union

Grasp patterns

- Grasp is the position in which an object is held by the hand.

It is defined as a position of the hand that facilitates contact of an object against the palm and the palmarm surface of partially flexed digits.



Some of the common grasp patterns are as follows:

1. Spherical grasp:

This type of grasp is used for holding spherical objects like ball or apple. In this type of grasp object remains in complete contact with palm, fingers and thumb.

Co-funded by the Erasmus+ Programme of the European Union

Cont.....

2. Cylindrical grasp:

Such type of grasp is used for holding cylindrical objects like pipe, glass etc.

The object remains in complete contact with fingers and partial contact with palm.

3. Hook grasp:

This type of grasp is used for holding objects with handle like suitcase, bucket etc. The object is held by flexing the fingers at IP joints.

Co-funded by the Erasmus+ Programme of the European Union

4. Opponance grasp/Intrinsic plus grasp:

This pattern is used in grasping and holding large, flat objects such as books or plates. In this grasp the object is held between tips of fingers and of thumb which is positioned opposite to fingers.

Co-funded by the Erasmus+ Programme of the European Union

Prehension

- Prehension is defined as a position of the hand that allows finger and thumb contact and facilitates manipulation of objects. Major

types of prehension are as

follows:

1. Lateral prehension:

In lateral prehension, the pad of the thumb is positioned to contact the radial side of the middle or distal phalanx of the index finger. This pattern of prehension is used in holding a pen or eating utensil, and in holding and turning a key

Co-funded by the Erasmus+ Programme of the European Union

- **2. Palmar prehension/ 3-jaw chuck**:

The thumb is positioned in opposition to the index and long fingers. The important component of motion in this pattern is thumb rotation, which allows for pad-to-pad opposition. This prehension pattern is used in lifting objects from a flat surface, in holding small objects, and in tying a shoe or bow.

Co-funded by the Erasmus+ Programme of the European Union

- 3. **Tip-to-tip prehension**:

The IP joint of the thumb and the DIP and PIP joints of the finger are flexed to facilitate tipto-tip prehension.

These motions are necessary for picking up a pin or a coin.

Co-funded by the Erasmus+ Programme of the European Union

Grip:

• While grasp is the pattern of holding an object, grip is the strength with which and object is held. It is measured by two methods. The first method is simple but is subjective. In this method it is noted if the grip is adequate and effective for a given task. The second method is objective and measured by an instrument called dynamometer.

Co-funded by the Erasmus+ Programme of the European Union

Eye hand coordination

- Eye hand coordination is the ability of the vision system to coordinate the information received through the eyes to control, guide, and direct the hands in the accomplishment of a given task, such as handwriting or catching a ball. It uses the eyes to direct attention and the hands to execute a task.
- It is an important aspect of hand function. Accurate reaching towards an object, grasping effectively in required pattern with required strength, carrying to desired position and releasing the object, all require proper monitoring of eyes.

Co-funded by the Erasmus+ Programme of the European Union

Development of eye- hand coordination

Birth to three years of age, an infant:

- starts to develop vision that allows them to follow slowly moving objects with their eyes
- begin to develop basic hand-eye skills, such as reaching, grasping objects, feeding, dressing
- begin to recognize concepts of place and direction, such as up, down, in
- develop the ability to manipulate objects with fine motor skills
- Between three and five years of age, little children:
- Continue to develop hand-eye coordination skills and a preference for left or right handedness.
- Continue to understand and use concepts of place and direction, such as up, down, under, beside.

Co-funded by the Erasmus+ Programme of the European Union

- Develop the ability to climb, balance, run, gallop, jump, push and pull, and take stairs
- Develop eye/hand/body coordination, eye teaming, and depth perception. one at a time.

Children between five and seven years old:

- Improve fine motor skills, such as handling writing tools, using scissors.
- Continue to develop climbing, balancing, running, galloping, and jumping abilities.
- Continue to improve hand-eye coordination and handedness preference.
- Learn to focus vision on school work for hours every day.

Co-funded by the Erasmus+ Programme of the European Union

Between three and five years of age, little children:

- Continue to develop hand-eye coordination skills and a preference for left or right handedness.
- Continue to understand and use concepts of place and direction, such as up, down, under, beside.
- Develop the ability to climb, balance, run, gallop, jump, push and pull, and take stairs one at a time.
- Develop eye/hand/body coordination, eye teaming, and depth perception.

Co-funded by the Erasmus+ Programme of the European Union

Children between five and seven years old:

- Improve fine motor skills, such as handling writing tools, using scissors.
- Continue to develop climbing, balancing, running, galloping, and jumping abilities.
- Continue to improve hand-eye coordination and handedness preference.
- Learn to focus vision on school work for hours every day.

Co-funded by the Erasmus+ Programme of the European Union

Disorders of hand function

- In cases of person with intellectual disability (MR), there is possibility of two types of hand function disorder

1. General delay in the development of hand functions.
2. Anomalies or deformities in structure of hand.

- In a person with MR the commonly found hand function disorders are:

1. Delayed development of hand functions
2. Atypical functional grasps
3. Anomalies and deformities in the structure of hand
4. Contractures
5. Prolonged presence of grasp reflex
6. Weakness of muscles

Co-funded by the Erasmus+ Programme of the European Union

Screening

- Screening of hand function can be done by testing:

1. If the person can do complete flexion of hand joints.
2. If the person can do complete extension of all the joints of hand.
3. If the person can do any three of the grasps: spherical, cylindrical, hook, lateral and opponance.
4. If the person can do a pincer grasp.

- Inability to succeed in any one of the above tasks is an indicator of poor development and disorder of hand functions. Complete assessment of disorder of hand function includes collecting information regarding range of motion, muscle strength, hand function and coordination.

Co-funded by the Erasmus+ Programme of the European Union

Therapeutic programme

• Therapeutic programme for correcting disorders of hand function is very specialised and customised one.

• It is to be done under the direction of an experienced and qualified therapist. Therapeutic programme depends on the particular disorder but some important aspects which needs to be kept in mind are:

- Exercises must be done gently within the tolerance of the person.
- Forced passive movements or painful actions may cause further complications.
- Psychologically the person should not become fearful otherwise they would not participate in therapy.

• Some of the activities to enhance hand functions used in therapeutic programme are using plasticine, theraputty, clay work, thread and bead work, rubber band activity, peg board, block stacking, woodwork, finger painting, squeeze ball, pinching clothespin, building blocks etc.

• For some therapeutic programmes, splints are also used with activities, exercises and therapies.

Co-funded by the Erasmus+ Programme of the European Union

Splints

- Splint is a rigid support given to any part of the body. There are three main reasons for which a part of the body may require such a rigid support like a splint. These reasons are :

1. To protect the injured part and thus to reduce pain.

2. To strengthen any weak muscle and thus assist it to carry out its action.

3. To prevent formation of contracture and deformities.

- Splints are made up of various material like metal, wood, thermoplastic, plaster etc.

Co-funded by the Erasmus+ Programme of the European Union

Some common hand splints

1. Wrist drop splint- Prevents wrist flexion contracture and deformity.

2. Cock up splint-Providing better extrinsic position of wrist for better grasp. These are probably the most commonly prescribed type of orthosis for the upper extremity. Indications for use include sprains, strains, tendonitis, arthritis, carpal tunnel syndrome, wrist fractures following cast removal, and other conditions that cause pain.

3. Dorsal block splint- Prevents unwanted extension of the finger while permitting flexion.

Co-funded by the Erasmus+ Programme of the European Union

4. Finger extension spring splint-
Provides assistance in finger extension.

5. Knuckle bender splint-
It is a finger flexion splint designed for assisting in simultaneously flexing the MCP joints of all digits without blocking IP joint or wrist motion.

Co-funded by the Erasmus+ Programme of the European Union

Hand equipment

Utensil Strap

Utensil Strap with Pen

bottle cuff. An aid to holding cold drinks.

Dining & Utensils

Co-funded by the Erasmus+ Programme of the European Union

Co-funded by the
Erasmus+ Programme
of the European Union