Cross Current International Journal of Medical and Biosciences
Abbreviated Key Title: Cross Current Int J Med Biosci
ISSN: 2663-2446 (Print) & Open Access
DOI: 10.36344/ccijmb.2023.v05i03.004

Volume-5 | Issue-3 | Sep-Oct, 2023 |

Review Article

Joint Mobilization and its Resultant Effects

Chinonso Vincent Nweke[1*], Nweke Chidera Augustine[2], Madume, Anelechi Kenneth[3], John Nwolim Paul[4], Dr.Chioma Akunnaya Ohanenye[5]

[1]Department of Medical Rehabilitation, University of Nigeria Enugu campus, Enugu state, Nigeria
[2]Department of Physiotherapy, Nnamdi Azikiwe University Akwa, Anambra state, Nigeria
[3]Dept of Physiotherapy, Faculty of Basic Medical Sciences, College of Medical Sciences, Rivers State University, Port Harcourt
[4]Dept of Human Anatomy, Faculty of Basic Medical Sciences, College of Medical Sciences, Rivers State University, Port Harcourt.
[5]Dept of Anatomy, College of Medicine and Health Sciences, Rhema University Nigeria, Aba, Abia State

***Corresponding author:** Chinonso Vincent Nweke

| **Received:** 23.08.2023 | **Accepted:** 27.09.2023 | **Published:** 03.10.2023 |

Abstract: Joint mobilization also called joint manipulation technique commonly used in a clinical setting to improve the range of movement of a joint in order to prevent stiffness and pain. Any joint which presents with pain or stiffness can be treated with mobilization except in rare instances such as where there is malignancy, bone infection, spinal cord compression or unhealed fracture. There are different grades of mobilization used to treat various conditions. Where there is significant local pain and inflammation, gentle mobilization is used (Grade 1 or 2) to help with pain relief and reduce inflammation by promoting movement. In conditions where there is not much pain but rather the main problem is joint stiffness, then a more vigorous mobilizing technique (Grade 3 or 4) can be used to help restore full range of movement. The manipulation can be considered as an advanced way of joint mobilization, because it shares the same biomechanical principles. So, in OMT, the manipulation consists on a linear translatoric movement (traction or gliding) performed in the joint's resting position, through a high velocity, low amplitude and low force thrust. These linear translatoric thrust techniques are technically more difficult to perform, but equally effective and much safer than the rotatory thrusts that have been traditionally performed. The manipulations are performed with the aim of obtaining joint surface separation and restoring the gliding component in joints that, even if they show an appropriate end-feel, they are hypomobile when examining them. It is a very effective technique if it is performed correctly and if it is indicated, but in the opposite cases it also carries serious injury risk. Because of the risk it can carry, and because of the expertise grade it requires for its execution, the manipulation training, mainly in the spine, for those physical therapists who have demonstrated their experience in the joint mobilization. However, basic low risk and equally effective manipulations exist, and they can be taught even in the pregraduate physical therapy studies.

Keywords: Thrust, Manipulation, Mobilization, Resisted, Normotonia, Adhesion, Spasm, Rigidity.

INTRODUCTION

Joint mobilization is a "hands on" physical therapy technique commonly used in a clinical setting to improve the range of movement of a joint in order to prevent stiffness and pain. The technique involves small movements performed by the physical therapist in an oscillating manner on the joints.

Assessment and mobilization

Before commencing joint mobilization, the physical therapist will commence by

- Assessing the (physiological) joint range of movement both actively and passively.
- Assessing the accessory ROM which includes gliding, sliding, traction.
- Assessing the level of adhesions of structures surrounding the joint.
- Assessing the presence of fluid within the joint or soft tissue (tenderness).

Before commencing joint mobilization, the physical therapist will determine if it is a necessary treatment by assessing the joint range of movement both actively (the patient performs the movement) and passively (the physical therapist feels for stiffness and pain by moving the joint). Any joint which presents with pain or stiffness can be treated with mobilization except in rare instances such as where there is malignancy, bone

Quick Response Code

Journal homepage:
https://www.easpublisher.com/

Citation: Chinonso Vincent Nweke (2023). Joint Mobilization and Its Resultant Effects. *Cross Current Int J Med Biosci*, *5*(3), 72-77.

infection, spinal cord compression or unhealed fracture. There are different grades of mobilization used to treat various conditions. Where there is significant local pain and inflammation, gentle mobilization is used (Grade 1 or 2) to help with pain relief and reduce inflammation by promoting movement. In conditions where there is not much pain but rather the main problem is joint stiffness, then a more vigorous mobilizing technique (Grade 3 or 4) can be used to help restore full range of movement.

Mobilization and pain relief techniques

- Gentle Joint Mobilizations (eg Maitland, Mulligan, Kaltenborn techniques)
- Mobility Exercises (eg McKenzie exercises)
- Minimal Energy Techniques (Osteopathic-based active joint repositioning techniques)
- Joint Manipulation (use of thrust involving high velocity and small amplitude) ie grade v
- Traction / Distraction Techniques

There are many types of joint mobilizing techniques that are commonly used by physical therapists and they tend to be named after the physical therapists who first promoted their use. Most commonly, physical therapists today use Maitland technique which uses small rhythmic oscillating movements (frequently on the intervertebral joints of the spine), McKenzie technique which utilizes the patient's active range of movement in combination with physical therapist passive movements and Mulligan technique which moves the joint in a perpendicular or parallel glide in contrast to the patient's movement. Extensive research has been performed regarding all of these techniques and their effect in treating joint pain and stiffness is proven as highly valid, which is why joint mobilization remains one of the most common modalities used by physical therapists. The joint mobilization as evaluation and treatment method for the joint dysfunctions is a main part of the Orthopaedic manual therapy (OMT). The aim of the joint mobilization is to restore the joint play, in order to normalize the rolling and gliding of any joint, which are necessary for the active normal and non-painful movement. Therefore, the OMT uses translatoric movements of the joint play, this is, the traction, gliding (together with traction) and the compression (usually to provoke symptoms), in relation to the treatment plane of the joint. Through the end-feel and the amount of movement which can be palpated with the traction and the gliding, the patient's injury can be assessed, and can also be treated in consequence, by moving the joint in the correct direction and using the different grades of movement, depending on the treatment's aim. To know which the correct direction in which the gliding for evaluation and treatment is, Kaltenborn established the Concave-Convex Rule, it allows easily deducing in which direction the limitation is and, therefore, in which direction the treatment has to be performed.Besides, the method considers, before the application of any technique, the tridimensional placing of the joint. Positioning the joint this way makes our treatment more effective, depending on the mobilization's aim. All of these aspects make an easy, safe and effective treatment method from the joint mobilization techniques, always if it is indicated and correctly applied.

Indications of mobilization

- Stiffness
- Adhesion
- Swelling
- Mild Pain
- Contractures

Contraindications of mobilization

- Deep vein thrombosis
- Fractures
- Severe pain

USES OF MOBILIZATION

Joint mobilization works by:

- Improving blood supply to the joints by assisting in the blood pumping effect of the venous system which reduces pain, reduces inflammation and promotes better movement.
- Altering the activity of the nervous system to cause less pain sensation in the affected area.
- Stretching the joint structures to achieve greater flexibility and range of motion.
- Improving physiological properties of the muscle
- Improve muscle tone
- improve Gross muscle power
- maintain integrity of muscle
- stretching of muscle fibers in order to maintain length, shape and vascular and neurological integrity.
- break tissue adhesion
- Break tissue contracture
- Mobilization of defected joints restores confidence in the affected joints

Common conditions that will benefit from joint mobilization are:

- Adhesive capsulitis (frozen shoulder)
- Tennis elbow or Golfer's elbow
- Neck and back pain and stiffness
- Post fracture or surgery
- Arthritis
- Osteoporosis
- Sports injuries
- Joint replacement
- Joint sprains
- Tendinopathies

Joint mobilisation treatment varies depending on the joint stiffness / hypermobility and the pain associated with moving ones joint. A skilled physiotherapist is the ideal health professional trained to assess and treat your joint dysfunction effectively.

Stiffness in joints

Joint stiffness or a locked joint can be associated with any joint, muscle, tendon and ligament injury. Also, joints can lock and become stuck in an open or closed position. Much like a door that doesn't quite fully swing open or close, it runs into something and it becomes stiff and/or painful. Normally, a simple alignment or control issue has caused the joint to move in an awkward and unnatural direction. As a result, the joint treatment method used to correct the locked joints will vary depending upon the physiotherapist's diagnosis. After a diligent assessment, a physiotherapist will discuss what techniques would be the most effective, safe and pain-free.

Common Examples of Joint Mobilisation & Pain Relief Techniques may include:

- Gentle Joint Mobilizations (eg Maitland, Mulligan, Kaltenborn techniques)
- Mobility Exercises (eg McKenzie exercises)
- Minimal Energy Techniques (Osteopathic-based active joint repositioning techniques)
- Joint Manipulation
- Traction / Distraction Techniques

USES OF MANIPULATION

Definition

According the the American Academy of Orthopaedic Manual Physical Therapists (AAOMPT) Description of Advanced Specialty Practice (DASP), orthopaedic manual physical therapy (OMPT) is defined as:

"OMPT is any “hands-on” treatment provided by the physical therapist. Treatment may include moving joints in specific directions and at different speeds to regain movement (joint mobilization and manipulation), muscle stretching, passive movements of the affected body part, or having the patient move the body part against the therapist’s resistance to improve muscle activation and timing. Selected specific soft tissue techniques may also be used to improve the mobility and function of tissue and muscles."

The International Federation of Orthopaedic Manipulative Physical Therapists (IFOMPT) defines manual therapy techniques as:

"Skilled hand movements intended to produce any or all of the following effects: improve tissue extensibility; increase range of motion of the joint complex; mobilize or manipulate soft tissues and joints; induce relaxation; change muscle function; modulate pain; and reduce soft tissue swelling, inflammation or movement restriction."

The manipulation can be considered as an advanced way of joint mobilization, because it shares the same biomechanical principles. So, in OMT, the manipulation consists on a linear translatoric movement (traction or gliding) performed in the joint’s resting position, through a high velocity, low amplitude and low force thrust. These linear translatoric thrust techniques are technically more difficult to perform, but equally effective and much safer than the rotatory thrusts that have been traditionally performed. The manipulations are performed with the aim of obtaining joint surface separation and restoring the gliding component in joints that, even if they show an appropriate end-feel, they are hypomobile when examining them. It is a very effective technique if it is performed correctly and if it is indicated, but in the opposite cases it also carries serious injury risk. Because of the risk it can carry, and because of the expertise grade it requires for its execution, the manipulation training, mainly in the spine, in OMT it is for those physical therapists who have demonstrated their experience in the joint mobilization. However, basic low risk and equally effective manipulations exist, and they can be taught even in the pregraduate physical therapy studies.

Terminology

The International Federation of Orthopaedic Manipulative Physical Therapists (IFOMPT) has offered the following definitions:

Manipulation: A passive, high velocity, low amplitude thrust applied to a joint complex within its anatomical limit* with the intent to restore optimal motion, function, and/ or to reduce pain.

Manipulation is a passive technique where the therapist applies a specifically directed manual impulse, or thrust, to a joint, at or near the end of the passive (or physiological) range of motion. This is often accompanied by an audible ‘crack’ [1]. The common feature of spinal manipulation techniques is the fact that they achieve a pop or cracking sound within synovial joints. The cause of this audible release is open to some speculation but it is widely accepted to represent cavitation of a spinal facet joint [2]. When there is a lower pressure than normal in the facet joint, gas bubbles are being formed in the joint. At the moment that the pressure rises, the bubble implodes, this is called cavitation. It is a intervention Physiotherpists have been employing since the beginning of physical therapy practice. However, physiotherapists providing spinal manipulations have come under the scrutiny of other professions even though manipulation is not exclusive to any one domain or profession. The challenge has been brought forth too many state legislators because some chiropractors have argued that manipulations are not within the scope of physiotherapy practice. The APTA has created a page that delineates the difference between physical therapy manipulation and chiropractic manipulation [3]. They have also published a manipulation education manual. Mobilization: A manual therapy technique comprising a continuum of skilled passive movements to the joint complex that are applied at varying speeds and amplitudes, that may include a small-amplitude/ high velocity therapeutic movement (manipulation) with the intent to restore optimal motion, function, and/ or to reduce pain. The terms "Thrust Manipulation" and "Non-Thrust Manipulation" have

been used in the literature. "Thrust Manipulation" is used to describe interventions described as Manipulation by IFOMPT, and "Non-Thrust Manipulation" would be synonymous with the term Mobilization as proposed by IFOMPT. The American Academy of Orthopaedic Manual Physical Therapists (AAOMPT) has proposed the following framework for describing manipulative interventions [1]:

1. Rate of force application: Describe the rate at which the force was applied.
2. Location in range of available movement: Describe whether motion was intended to occur only at the beginning, towards the middle, or at the end point of the available range of movement. The term available range of movement is intended to describe the available movement as perceived by the therapist after the patient has been positioned and at the time the technique is applied. The available movement may or may not be the same as the range of motion available at a particular joint or region under other circumstances. The use of the terms beginning, mid, and end point of available movement are only relevant in the context of describing the particular technique at the time it is applied. The term end point should not be associated with any particular anatomic structures, as many structures have the potential to limit motion depending on the individual patient and technique.
3. Direction of force: Describe the direction in which the therapist imparts the force. This description should be devoid of the "intent" of the technique and, instead, should follow standard anatomical and biomechanical conventions.
4. Target of force: Describe the location where the therapist intended to apply the force. In the case of the spine, force may be directed at a specific level, or more generally across a particular region such as mid lumbar or lower thoracic. The task force suggests that replication of techniques among therapists will be more easily achieved if clearly palpable structures are used as reference points. For most peripheral joints associated with the appendicular skeleton, the target of force may be appropriately described using a specific joint as a reference. It is important to note that the use of a joint, or a particular spinal level, for reference as to where the force is applied is not intended to imply any particular theoretical assumption as to structures affected by a manipulation, but only to provide information about where the force was applied.
5. Relative structural movement: Describe which structure or region was intended to remain stable and which structure or region was intended to move, naming the moving structure or region first and the stable segment second, separated by the word "on." For example, a "lower lumbar on upper lumbar" technique implies that the clinician intended to move the lower lumbar region while stabilizing the upper lumbar region. Techniques associated with the peripheral joints would be described utilizing the same convention (eg, tibia on femur, humerus on scapular glenoid).
6. Patient position: Describe the position of the patient (eg, supine, prone, recumbent). This would include any premanipulative positioning of a region of the body, such as being positioned in rotation or side bending.

USES OF MANIPULATION

Manipulation is very useful in the following;

- Reducing joint pain
- Preventing joint stiffness by improving ROM
- Breaking of adhesions and contractures
- Reduction of joint and soft tissue swellings
- distracting impacted tissue,
- providing movement and
- lubrication for normal articular cartilage
- Improving blood supply to the joints
- Altering the activity of the nervous system to cause less pain sensation in the affected area.
- Stretching the joint structures to achieve greater flexibility and range of motion.
- Improving physiological properties of the muscle
- Improves muscle tone

Stretching of muscle fibers in order

- To Maintain Length,
- Shape
- Vascular And
- Neurological Integrity
- Mobilization Of Defected Joints Restores Confidence In The Affected Joints

These two symptoms can occur in isolation or they can occur simultaneously, which means a patient can have joint stiffness and pain. State of normalcy in a joint; For full and pain-free movement a joints need to move freely in all directions that they were designed to. If they become locked or restricted in any particular direction, pain and/or stiffness may be experienced. Luckily, with the assistance of a skilled physiotherapist who understands the joints, a patient can quickly and easily regain full joint range and pain-free movement. To achieve this, the physiotherapist will assess which of the joints are:

- Painful (But Normal Motion)
- Stiff
- Painful And Stiff
- Hypermobile
- Painful And Hypermobile Stretching And Self-Stretching:

The stretching and self-stretching are mobilization techniques of the soft tissues and they are integrated inside most of the physical therapy treatments. However, it is frequent to observe that these stretching exercises are not correctly performed, and they lose effectiveness and even, in the worse cases, provoke injuries in other places (for example, hypermobilities in

vertebral segments). Therefore, Evjenth created a new stretching methodology, based on the patient's and therapist's ergonomics and care. A stretching method which integrates Proprioceptive Neuromucular Facilitation (PNF) techniques in order to facilitate the muscle's lengthening and it also uses physical therapy equipment, such as the fixation belts, in order to allow an analytic stretching of each muscle adapted to the patient's pathological process.

Functional massage

The functional massage is a physical therapy technique, introduced by Evjenth in the Orthopaedic Manual Physical Therapy (OMT), which combines the passive mobilization of the joints and of the functionally related muscles. It is a massage technique that simultaneously associates the muscle compression and the stretching of the muscle which provokes the joint mobilization. Therefore, this technique integrates the benefits both of the massage as of the passive joint mobilization, so it becomes a very useful tool both for the treatment of the contracting and non-contracting tissue as for the evaluation of the analytic mobility of these structures. Spinal manipulations can relieve back pain by taking pressure off sensitive nerves or tissue, increase range of motion, restoring blood flow, reducing muscle tension, and, like more active exercise, promote the release of endorphins within the body to act as natural painkillers.

CRITERIAS FOR MANIPULATION

The following five factors are the criteria included in the five factor predictor rule for manipulation:

- Pain lasting less than 16 days
- No symptoms distal to the knee
- FABQ score less than 19(Fear avoidance Belief Questionnaire)
- Internal Rotation of greater than 35 degrees for at least one hip
- Hypomobility of a least one level of the lumbar spine

  The patients that received the most benefit from spinal manipulation for LBP are those that met at least four out of the five criteria for spinal manipulation. The positive likelihood ratio for those exhibiting four out of five of the factors is 24.3 However, the two most important identifiers for manipulation are:
- Pain lasting less than 16 days
- No symptoms distal to the knee

Contra-indications

The following scenarios are contraindications to low back pain [2]:

- Any pathology that leads to significant bone weakening
- Neurological: cord compression, cauda equina compression, nerve root compression with increasing neurological deficit
- Vascular: aortic aneurism, bleeding into joints
- Lack of diagnosis
- Patient positioning can not be achieved because of pain or resistance.

Adverse effects

- Vertebral artery dissection
- Acute vertigo
- Cerebro vascular accidents

REFERENCES

1. APTA. (n.d). Manipulation fckLREducation Manual fckLRFor Physical Therapist fckLRProfessional Degree Programs. Available online at http://www.apta.org/uploadedFiles/APTAorg/Educators/Curriculum_Resources/APTA/Manipulation/ManipulationEducationManual.pdf
2. Assendelft, W.J.J., Morton, S.C., Yu, E.I., Suttorp, M.J., Shekelle, P.G. (2008) Spinal manipulative therapy for low-back pain (Review). *The Cochrane Library, Issue 4.*
3. ACC. (2004). New Zealand Guidelines for Low Back Pain.
4. APTA. (n.d). Manipulation/Mobilisation. Available online at http://www.apta.org/StateIssues/Manipulation/
5. Fritz, J. M., Cleland, J. A., & Childs, J. D. (2007). Subgrouping patients with low back pain: evolution of a classification approach to physical therapy. *journal of orthopaedic & sports physical therapy*, *37*(6), 290-302.
6. Flynn, T., Fritz, J., Whitman, J., Wainner, R., Magel, J., Rendeiro, D., ... & Allison, S. (2002). A clinical prediction rule for classifying patients with low back pain who demonstrate short-term improvement with spinal manipulation. *Spine*, *27*(24), 2835-2843.
7. Fritz, J. M., Brennan, G. P., & Leaman, H. (2006). Does the evidence for spinal manipulation translate into better outcomes in routine clinical care for patients with occupational low back pain? A case-control study. *The Spine Journal*, *6*(3), 289-295.
8. Hegedus, E. J., Goode, A., Butler, R. J., & Slaven, E. (2011). The neurophysiological effects of a single session of spinal joint mobilization: does the effect last?. *Journal of Manual & Manipulative Therapy*, *19*(3), 143-151.
9. Gibbons, P., & Tehan, P. (2001). Patient positioning and spinal locking for lumbar spine rotation manipulation. *Manual Therapy*, *6*(3), 130-138.
10. Heijmans, W. F. G. J., Hendriks, H. J. M., Esch, M. V. D., Pool-Goudzwaard, A., Scholten-Peeters, G. G. M., Van Tulder, M. W., ... & Oostendorp, R. A. B. (2003). KNGF-richtlijn Manuele Therapie bij Lage-rugpijn. *Nederlands Tijdschrift voor Fysiotherapie*, *113*, 1-40.
11. Rubinstein, S. M., van Middelkoop, M., Assendelft, W. J., de Boer, M. R., & van Tulder, M. W. (2011). Spinal manipulative therapy for chronic low-back pain. *Cochrane Database of Systematic Reviews*, (2).
12. Rubinstein, S. M., van Middelkoop, M., Assendelft, W. J., de Boer, M. R., & van Tulder, M. W. (2011). Spinal manipulative therapy for chronic low-back

pain: an update of a Cochrane review. *Spine*, *36*(13), E825-E846.

13. National Institute of Clinical Excellence. (2009) Low back pain: Early management of persistent non-specific low back pain.
14. Physiotutors. When to Manipulate the Lumbar Spine | Flynn Clinical Prediction Rule. Available from: https://www.youtube.com/watch?v=vky_6Nv0KK0