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The role of kinesiotherapy in treating the symptoms of obstetric palsy

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Abstract

Obstetric palsy (OP) is the partial or total paralysis of the upper limb due to injury of the brachial plexus during childbirth. Early kinesiotherapy intervention helps to treat motor disorders faster and more effectively by reducing upper limb disability. The aim of this review is to describe recent research data on kinesiotherapy applications in patients with OP. The Google Scholar and PubMed databases were searched with the following keywords: obstetric palsy, kinesiotherapy, rehabilitation. This review included five articles. In conclusion, the application of kinesiotherapy contributes to the better treatment of motor and sensory disorders of the paretic muscles caused by OP as it helps to maintain the range of motion of the glenohumeral joint, to prevent stiffness, to maintain muscle tone, to increase muscle strength and endurance and, consequently, to improve function of the affected limb.

Keywords: Obstetric palsy, kinesiotherapy, rehabilitation

Introduction

Obstetric palsy (OP) is characterized by paralysis of all or part of the upper limb, which occurs in the newborn during childbirth^[1, 2]. Damage to the limb is usually apparent immediately after delivery as there is a loss of sensation and mobility and the limb remains immobile in a specific position and often there is pallor, swelling and hypersensitivity in the supraclavicular region and in the arm area^[3]. Other symptoms that may coexist are: crepitus in the shoulder joint, dislocation or subluxation of the shoulder, fracture of the arm or clavicle, deformity of the acromion and coracoid process, paralysis of the corresponding hemidiaphragm (accompanied by cyanosis and dyspnea)^[1].

According to Fragaraptis^[1], depending on the location of the injury, OP is categorized into four types: upper, lower, intermediate and total. Total brachial plexus palsy affects about 12% of OP cases. It is a complete paralysis of all upper limb muscles with the C5-T1 roots of the plexus being injured. In this type of OP, the affected upper limb is limp along the trunk, with the forearm being pronated, the elbow extended and the arm in general is adducted and rotated internally.

Upper brachial plexus injury is the most common type of OP. It is called Erb's palsy, concerns about 80% of OP patients and is located in the C5, C6 and C7 roots. Regarding motor disorders, the following are observed: Inability to abduct and supinate the forearm, biceps muscle reflex loss and atrophy of the biceps, deltoid and brachialis anterior muscles. In addition, the patient experiences tenderness on the lumbar surface of the forearm and the outer surface of the arm. The clinical picture of the condition includes adduction and internal rotation of the affected limb, adduction of the thumb, flexion of the other fingers, slight flexion and ulnar deviation of the thumb and extension and pronation of the forearm.

Intermediate palsy is the rarest type of OP and it rarely occurs in its pure form; that is, paralysis that only affects the middle area of the brachial plexus. It is an atypical form of sciatic and median nerve injury that is located in the C7 root. As far as muscles are concerned, it affects the extensor muscles of the fingers, wrist and forearm.

Lastly, lower brachial plexus palsy (Klumpke's paralysis) is located in the C8 and T1 roots. It is a rather uncommon type of OP, which mainly affects the muscles innervated by the ulnar nerve and to a lesser extent those innervated by the median nerve.

As such, the ulnar flexor of the wrist and the finger flexors, which are innervated by the C7 roots, are less affected by muscle atrophy than the thenar, hypothenar, lumbrical and interosseous muscles. The clinical picture includes a deformity of the hand known as “claw hand”. Regarding motor disorders, an inability to perform the following is observed: wrist and finger flexion, finger abduction and adduction and thumb-little finger opposition.

According to Abid [4], the incidence of OP ranges between .04-.44 of live births. A large percentage of the disorder is due to injury to the nerve components of the brachial plexus during childbirth, due to the following factors: (1) Narrow pelvis of the mother (pelvic-head disproportion), (2) Difficult delivery, especially when the newborn is overweight (over 4 kgr), (3) Shoulder dystocia (when the shoulders are pulled out with a violent side bend of the head), (4) Hip projection, where the injury is caused by the tension exerted on the brachial plexus, due to lateral flexion of the trunk and neck, accompanied by raising of the arms and (5) Mishandling of the obstetrician (exerting pressure during gripping the baby, stretching from abrupt pulling, causing fractures of the clavicle during the ejection phase) [1, 5].

The recovery rate as noted by several researchers varies. Smith *et al.* [5] report that the onset of biceps function within the first three months of life is a good predictor of improved upper limb function in adulthood, while biceps activation after the fourth, fifth, or sixth month of later life had significantly worse function, according to the criteria described by Mallet [5].

Physiotherapy has been shown to help better treat symptoms in patients with OP [6, 7]. The application of natural means such as splints, proper immobilization of the limb, electrotherapy, massage, but also special exercises through kinesiotherapy with passive and active exercises is very important for these patients [1, 6, 7]. The aim of this review was to describe recent research data on kinesiotherapy applications in patients with OP.

Literature review

The Google Scholar and PubMed databases were searched with the following keywords: obstetric palsy, kinesiotherapy, rehabilitation. This review included five sources. Below are the main conclusions of the articles included in this review.

El-Shamy and Alsharif [8] wanted to compare the effect of virtual reality kinesiotherapy with conventional physiotherapy on upper limb function in 40 children with OP. Participants were randomly divided into two groups, where both groups followed a 12-week program three times a week for 45 minutes per session.. The intervention group followed a kinesiotherapy program using the Armeo® virtual reality program, whereas the control group followed a program with conventional exercises. The following were evaluated before and after the intervention with a goniometer, a handheld dynamometer and the Mallet system: isometric strength of the external rotators and shoulder abductor muscles and Mallet scores for shoulder external range of motion, function and abduction. The results of this study showed statistically significant differences after the intervention in the group that followed the exercise program through virtual reality in comparison to the control group, in the force of abduction of the arm as well as in the force of the external rotation.

In another study, Philandrianos *et al.* [9] attempted to study the effect of an intensive kinesiotherapy program on children with OP who regained biceps function between the third and sixth month after birth. Their research hypothesis was based on the fact that the prognosis of children in whom the biceps muscle

regains its function up to the third month after birth, in relation to those whose biceps muscle function is restored by the sixth month shows a significant difference and that very often surgeries are performed without a complete picture of upper limb function. Their study involved 22 children with OP, nine of whom had regained the function of the biceps before the third month after birth, while the remaining 13 regained the function of the biceps after six months. All 22 children underwent an intensive kinesiotherapy program from birth. The researchers noted that there were significant improvements in both categories, while the main finding of this study was that the intensive kinesiotherapy program implemented was able to prevent premature and unreasonable surgical intervention.

Furthermore, Azzam [10] investigated the effect of shoulder mobilization on improving shoulder flexion in children with OP. Their study involved 30 children with OP, who were divided into two groups (intervention and control). The first group followed a physiotherapy program with mobilization of the scapular joint, while the control group followed a conventional physiotherapy program. Both programs had a duration of 12 weeks. The range of motion of the shoulder flexion with a goniometer and the stand-and-reach test score were evaluated before and after the intervention. The results of the study showed a statistically significant difference in the range of motion of the shoulder in the group in which the shoulder was mobilized after the intervention in relation to the control group. The researchers concluded that shoulder mobilization has a positive effect on the physiotherapy of children with OP and suggested adding such exercises to kinesiotherapy programs applied in clinical practice.

Fragoraptis [1] states that the application of kinesiotherapy is the main physiotherapy tool in the treatment of obstetric paralysis, because it achieves faster activation of the paretic limb. The physiotherapy program they propose includes passive movements, stretching of the muscles, the upper limb and especially the biceps, range exercises, and strengthening exercises. According to the author, the kinesiotherapy program helps to maintain the range of motion of the joints, to prevent stiffness, to maintain and increase muscle strength, to strengthen the muscles and, consequently, to improve the function of the affected limb.

Lastly, Terzis and Papakonstantinou [11] also studied the effect of kinesiotherapy in children with OP. Their systematic review included three clinical trials involving the application of protocols based on the method of kinesiotherapy. These protocols were compared with either control groups or groups that included a combination of kinesiotherapy and physiotherapy. The researchers found that there were positive effects on the functional ability of children when kinesiotherapy was used as the sole means of therapy in relation to a control group. However, the results were limited when comparing the efficacy of kinesiotherapy with the combination of other physiotherapy methods.

Discussion – Conclusions

The results of this review show that the application of kinesiotherapy can significantly contribute to the improvement of upper limb function in children with OP. The application of stretching and the passive mobilization of the affected limb from the beginning of the diagnosis seems to contribute to the best functional result in the first year of life of the infant [8,9]. Mobilization of the scapular joint also seems to play an important role in the functional rehabilitation of the upper limb [10]. The key muscle according to many researchers seems to be

the biceps, whose activation within the first trimester after birth is a strong prognostic indicator for a satisfactory functional result^[5]. The kinesiotherapy program is important to be applied from the beginning after the splint is removed; passive movements are performed 2-3 times a day, for about 10 minutes^[1]. These movements should be gentle and involve all the joints of the affected upper limb. Stretching should always be done within the limits of tolerance, so that the baby does not react with crying pain.

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