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Treatment and Physical Therapy for Scoliosis Patients

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Abstract. Abstract: Scoliosis is a sideways curvature of the spine. It impacts around 2-3% of the U.S population and is primarily prevalent in teenagers from the ages of 8-18. Though most cases are mild, it tends to worsen as the patient grows or goes through puberty. Traditional scoliosis treatments are usually observation, bracing, and surgery, if necessary, but new advances have highlighted the effectiveness of non-surgical approaches, particularly physical therapy and sports exercise. This paper examines the success rate of various non-invasive methods, focusing on how well they can stop the progression of curves, strengthen the muscles surrounding the spine, and promote better physical function in the long term. The Schroth method, yoga, Pilates, and swimming are some of the sports and physical therapy approaches included. Through reviewing research findings and patient outcomes, this paper discusses the possibility that these treatments can be better alternatives in improving the overall quality of life for scoliosis patients.

Keywords: Scoliosis, Non-Surgical Treatment, Sports Therapy.

1. Introduction

Scoliosis is a musculoskeletal condition characterized by an abnormal lateral curvature of the spine. The population most affected by scoliosis are adolescents. In the United States, around 2 to 3 percent, or about 9 million people, have scoliosis. In many cases, however, it does not need to be treated. In others, it can cause long term physical and psychological issues. Furthermore, the impact that scoliosis can have includes consistent back pain, impaired respiratory function, possible reduced mobility, and overall diminished quality of life. A variety of challenges can arise if scoliosis is not treated properly. Usually, scoliosis has been treated with observation, bracing and, if necessary, surgery. However, research on non-surgical methods, especially for adolescents and younger kids, have greatly increased in recent years. These methods include a variety of sports and physical therapy.

This paper aims to explore the use of physical therapy and sports as a method of treatment. Mainly, the goal of these exercises is to contain the scoliosis curve from worsening while strengthening the muscles around the spine to better support it. There are various options and approaches to sports therapy, including the traditional physical therapy with trainers, as well as strengthening exercises, stretching, and training for balance and coordination. Participation in sports like pilates, yoga, and swimming are also recommended. The effectiveness of these therapies in halting the advancement of spinal curvature, improving physical function, and lowering the risk of subsequent complications—like persistent back pain and the need for surgery—is assessed in this paper. This research highlights the potential of these non-invasive treatments in enhancing the overall quality of life and long-term health outcomes for adolescents with scoliosis by analyzing clinical studies, patient outcomes, and comparative analyses [1].

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2. Diagnosis

Scoliosis can occur at any age, but Adolescent Idiopathic Scoliosis (AIS) is the most common form, affecting up to 3% of children between the ages of 10 and 18. Most often, this type of scoliosis is discovered and diagnosed in teens just as they hit puberty and the scoliosis curve drastically worsens. Despite popular opinion, scoliosis is not caused by bad posture. The exact cause of idiopathic scoliosis remains unknown, but it is often connected to a combination of development, genetic, or even environmental factors. If untreated, orthopedic idiopathic adolescent scoliosis can result in long-term problems. If the issue worsens, it can cause a more noticeable spinal deformity that would require surgery in the future. Untreated scoliosis also raises the possibility of chronic back pain, spinal issues, and an increased likelihood of back injuries in adulthood, which can seriously limit a person's capacity to engage in activities. Surgery also has a risk of complete paralysis.

Given these long-term consequences, it is crucial for medical professionals to investigate non-surgical therapy alternatives that might successfully manage adolescent scoliosis is essential given these possible long-term consequences. In order to improve physical function, stop the progression of spine curvature, and lessen the need for surgical correction, physical therapy and sports-based therapies are growing in popularity. These non-invasive procedures take care of more than just the scoliosis's acute physical problems [2,3].

Scoliosis can be more specifically categorized based on where the curvature of the spine occurs. The cervical (neck), lumbar (lower back), thoracic (mid-back), and thoracolumbar (the connection of the thoracic and lumbar spines) are the main areas of the spine where scoliosis can develop. The curve's placement has a significant effect on the symptoms, how they progress, and which treatment methods to use.

2.1. Thoracic Scoliosis

This is a curvature affecting the thoracic (mid-back) area of the spine, extending from the T1 to the T12 vertebrae. This particular type of scoliosis can cause the rib cage to rotate, resulting in a prominent rib bump on one side of the back. Because thoracic scoliosis affects the ribs, it is frequently linked to more noticeable aesthetic issues. Because there is less room for the lungs to expand, severe thoracic curvature may impair lung function and perhaps cause respiratory problems. In cases of adolescent idiopathic scoliosis (AIS), it is one of the most prevalent forms of scoliosis [4].

2.2. Lumbar Region

The L1 through L5 vertebrae are part of the lumbar (lower back) area that is affected by lumbar scoliosis. The symptoms for this type of scoliosis are uneven hips and an asymmetrical waistline. Lower back pain can also result from this kind of scoliosis, particularly in adults or people with degenerative scoliosis. Scoliosis in the lumbar spine can result in severe discomfort and functional impairment because this region is essential for movement and load-bearing. Because of the degenerative changes, lumbar scoliosis is more common in adults and less common in teenagers.

2.3. Thoracolumbar Scoliosis

A curvature that crosses the upper lumbar and lower thoracic portions of the spine, usually from T12 to L1. This kind of scoliosis can have characteristics of both lumbar and thoracic scoliosis, which can result in a variety of symptoms such as unequal hips and rib cage deformity. Thoracolumbar curves can alter the stability of the lower spine and the rib cage [5].

2.4. Double Major Scoliosis

This is characterized by the presence of two principal curves of comparable intensity, usually located in the lumbar and thoracic regions. This causes the spine to have a S shape, the torso may appear more symmetrical due to the balancing effect of both curves, which often conceals the severity of the scoliosis. Because of its balanced appearance, this type of scoliosis can be difficult to diagnose in its early stages. Having two large curves can cause a variety of complex symptoms that impact the lower and upper

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extremities of the spine. Double major scoliosis is less common but is often developed as a result of the spine trying to balance out one main curve [6].

3. Treatments Further Research

When managing scoliosis, observation is frequently the first course of action, especially in cases where the spine curvature is relatively small and there is little likelihood of curve progression. When the Cobb angle, meaning the degree of spine curvature, is less than 20 degrees, this method works well, especially in younger patients who are still growing. With observation, a patient visits an orthopedic surgeon on a regular basis, usually every four to six months, to track developments in the curvature. When the child has a small curvature and is yet to reach skeletal maturity, this approach works especially well.

The degree of the curve, the patient's age, development potential, and the rate at which the curve progresses all play a role in the decision to go from observation to active therapy. Before beginning active treatment, like bracing or surgery, there are a few requirements that need to be met. Firstly, the usual cutoff point for exploring intensive treatment is an increase in Cobb angle of more than 5 degrees within a 6-month period. An intervention is necessary when the curve is greater than 20 degrees, particularly in a kid or adolescent who is still growing, as this increases the possibility of curve progression. As the patient gets closer to skeletal maturity, the likelihood of a progression lessens, which can have a substantial impact on the choice of whether a patient should remain under observation or to initiate active treatment [7].

Bracing is a popular non-surgical treatment for scoliosis patients to stop their spine curvature from developing further. The patient's age and skeletal maturity, together with the location and severity of the curvature, all influence the type of brace that is prescribed. The most widely used brace, the Boston brace, is intended to provide corrective pressure to the lumbar and thoracic areas. It is a stiff plastic underarm brace that is custom-molded and worn beneath clothes. Another brace, the Providence brace, is used at night that is shaped to be bent and is intended to provide corrective pressure on the patient when they are in a lying posture. Since it is a nighttime brace, it can be used in conjunction with the Boston brace. For patients with a moderate curvature (usually between 25 and 45 degrees) who are still growing, bracing is the most effective way to stop the curve from getting worse with growth. According to research, bracing can lessen the chance that a curvature would grow to the point where surgery is required. The kind of brace, the degree of curvature, and—most importantly—the patient's compliance with wearing the brace for the recommended amount of time—typically 18 to 23 hours each day—all affect how well bracing works. However, bracing has many drawbacks. It greatly limits movement and ability to participate in activities, it is very hard to cover with clothing and appears bulky, and it can also weaken the patient's back muscles [8].

Patients with severe scoliosis or those whose curvature worsen despite non-surgical treatments are typically suitable for surgery. There are several surgical techniques for scoliosis, the most popular being spinal fusion. Spinal fusion involves joining the affected vertebrae together with metal rods, screws, or hooks and bone grafts. The goal of this surgery is to stop the spine from bending further by forcibly fusing the spine together. The result is that the correction is maintained because the fused region of the spine is immobile. For younger children who are still growing, growing rods are flexible rods that are attached to the child's spine and extended through additional surgery every few years to keep up with the child's growth. This process maintains curvature control while enabling the spine to continue growing. Scoliosis surgery is an extremely severe treatment option, which has the risk of paralysis.

4. Sports and Physical Therapy in Scoliosis Treatment

In the non-surgical treatment of scoliosis, physical therapy (PT) is essential, especially for teenagers, as early intervention can reduce symptoms and stop the curvature of the spine from worsening. The goals of physical therapy are to enhance a patient's strength, flexibility, posture, and total spinal alignment. PT offers psychological benefits in addition to physical ones by enabling patients to actively manage their condition. Through exercise, patients can enhance overall quality of life and lessen anxiety associated with scoliosis [9].

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4.1. Schroth Method

A particular non-surgical physical therapy strategy is called the Schroth Method. This technique, which was created in Germany in the 1920s by Katharina Schroth, is based on the idea of three-dimensional scoliosis repair. By combining targeted workouts, posture adjustments, and breathing exercises, it aims to extend the spine, address spinal asymmetry, and stabilize the spine. Exercises in the Schroth Method are highly customized to the unique curvature pattern and degree of scoliosis experienced by each patient. The technique is well-known and utilized in Europe, and it is becoming more and more common in the US and other countries as a conservative scoliosis treatment option, especially for adults and teenagers. However, this method is not as effective for patients with severe scoliosis, since it is not as invasive or active as bracing or surgery. Therefore, it is best to be used in conjunction with other methods of treatment.

4.2. Sports Therapy

As more and more studies show that kinesitherapy can improve scoliosis, many medical professionals believe that children with scoliosis up to 30 degrees can participate in sports as therapy. However, it does depend on the specific sport. A 2007 study by Karski, Kalakucki, and Karski details the desired impacts of specific sports on kids' skeletal growth. Sports that involve symmetrical muscle engagement, including gymnastics, rhythmic gymnastics, and swimming, are advised since they are thought to have positive impacts on the condition of deformity as well as prevention. Exercises for mobility, balance, coordination, postural correction, and strengthening are beneficial. However, sports like fencing, tennis, rowing, and track and field throwing that involve many one sided and asymmetric movements can be counterintuitive for scoliosis therapy. According to Swärd (1992), scoliosis is found in 80% of athletes in sports with asymmetric movements, including javelin throwers and tennis players. It is important for people with scoliosis to stay active and strengthen their back muscles to support the spine better, but the type of activity can greatly impact the condition [10].

4.3. Rhythmic Gymnastics

As a sport, rhythmic gymnastics has a set of carefully selected exercises that support the balanced development of the body as a whole. A habit of maintaining proper posture in all positions is formed by practicing exercises symmetrically, and it is characterized by rigorous requirements in various techniques. Though it can be beneficial for overall muscle development in scoliosis patients, it can be harmful for scoliosis patients to participate competitively. There is a lot of persistently repeated asymmetric stress on the growing spine associated with the nature of rhythmic gymnastics. People who do rhythmic gymnastics have a 12% incidence rate of scoliosis compared to the 1.1% for their peers (Tanchev, Dzherov, Parushev, Dikov, and Toddorov, 2000).

4.4. Swimming

A sport that is often recommended for scoliosis patients is swimming. Benefits of swimming as a sport include the buoyant effect of the water, which makes movement easier, and symmetric muscle engagement. More specifically, breaststroke in swimming is the most beneficial in addressing spinal curvature. The muscles in the arms, shoulder, trunk, and legs are all used when swimming – promoting a form of exercise and muscle strengthening that does not put unnecessary and harmful pressure on the spine. Studies have shown that corrective swimming has beneficial effects for posture, back, and spine related issues in young children and teens.

4.5. Yoga and Pilates

Yoga and Pilates are becoming widely recognized as an effective, non-surgical form as scoliosis therapy. Both exercises have a focus on building strength and muscle through low impact training. This is ideal for scoliosis patients, as physical therapy needs to target on strengthening certain muscles while also maintaining overall fitness. Various research studies have examined the efficacy of Pilates and how it

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works with different forms of therapy, including the Schroth method. These studies measure the outcomes using the Cobb angle, quality of life, and physical function [11].

5. Conclusion

It is not advised for patients with scoliosis to engage in competitive sports that require a greater range of motion, especially when it comes to maximum thoracic spine extension and/or lumbar spine flexion. Sports as corrective therapy is a great method of treatment, but only if advised by physical therapy or spinal medical professionals. Overall, sports that do not put unnecessary tension and stress on the spine are the most effective for scoliosis therapy. Specific sport activities in conjunction with the traditional bracing can produce the most beneficial result in lessening the scoliosis curve in young patients as well as preventing future back pain or spinal issues.

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