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In conjunction with

ABOUT THIS SPECIAL ISSUE

Physical activities have a key part in every area of the anatomical and physiological system of the human body, although the value of exercise in human health is rarely acknowledged in day-to-day living.

In recent days more data are shown most musculoskeletal problems are caused by poor physical activity and poor ergonomics even though they developed as physical illnesses and disorders.

Physiotherapy brings a huge contribution to an individual's life health and physical abilities. These abilities are considered to be a cornerstone for Health well-being for pediatrics as well as geriatrics.

So we like to update the importance, effectiveness, benefits, and awareness of physiotherapy school-going, college-going students, Cardiovascular, Gynecological illnesses. Many researchers and professors in physiotherapy study the effect of exercise on human health and everyday finding in the research.

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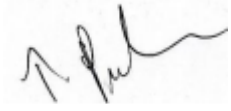
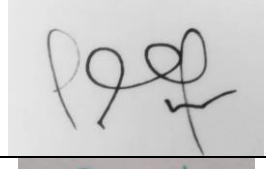
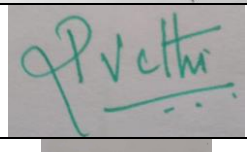
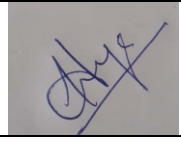
Dr. T. Prabha	Professor, Nandha College of Pharmacy, Erode-638052, Tamilnadu, India	
Dr. S. Sengottuvelu	Professor, Nandha College of Pharmacy, Erode-638052, Tamilnadu, India	
R. Vasanthi	Professor, Nandha College of Nursing, Erode-638052, Tamilnadu, India	
A. Hamidhunniza	Professor, Nandha College of Nursing, Erode-638052, Tamilnadu, India	

SP-1

Influence of Hamstring and ThoracopelvicROM In Undergraduate Students With LBA By Treating With METand PRT

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Abstract: College students frequently sit for long periods of time and travel, causing hamstring tightness and Low Back Ache (LBA), as well as decreased Range of Motion (ROM) in the lumbar, trunk, and pelvic regions, resulting in difficulties performing ADLs at a young age.The study is deigned to focus on the importance to improve strength, power and resolving low back ache in younger college going students. Specific hamstring stretches can bring good ROM as well as a good flexibility.A total of 30 students were selected based on the inclusion and exclusion criteria and divided into two groups via a convenient sampling method. Group A (n=15) received a set of Muscle Energy Technique(MET) and Group B (n=15) received Positional Release Technique (PRT) for 12 weeks.The pre-and post-value were assessed by Active Knee Extension (AKE) Test for both left and right leg, Modified Schober's Test, Fingertip to Floor Test in Group B. The mean difference values are 31.33, 33.40, 3.87, and 7.33 respectively. The Standard deviation is 7.90, 6.20, 0.74, and 1.95 respectively. The paired't' values are 15.36, 20.88, 20.15, and 14.55. The paired't' test values are more than table value 2.15 for a 5% level of significance. The calculated't' values by unpaired 't' test assessed by AKE Test for both left and right leg, Modified Schober's Test, Fingertip to Floor Test were 4.06,3.70, 4.17, and 3.26. The calculated't' values were more than the table value 2.05 for a 5% level of significance at 38% of freedom. The study was conducted for following 4 weeks of interventions the outcome was measured using the AKE test, Modified Schober's test, Fingertip to Floor Test. Based on the standard deviation and't' values there is considerable improvement in the condition of students henceforth PRT helps in improving the quality of life of students. MET, as well as PRT both treatment protocols, gave excellent results, but when compared Positional Release Technique tends to be more effective than Muscle Energy Technique.

Keywords: College-going students, Muscle Energy Techniques, Positional Release Technique, Active Knee Extension Test, Modified Schober's Test, Fingertip to Floor Test.

1. INTRODUCTION

Low back pain plays the largest role inmajority working age population for being absent at work and almost fifty percent of the young population would have undergone an episode of low backache significantly by the age of 31. It was reported to be 23.09 percent in India. Abnormalities like muscle dysfunction (shortening, imbalances, or weakening of muscle), instability, overuse, and articular abnormalities are all common causes of acute low back pain, lower back dysfunction, injury, or accident most typically involving a motor vehicle. Physical therapy services are said to account for 37 % of all healthcare costs linked with low back pain. Nonspecific episodes account for 85-90 percent of all episodes of low back pain.[1-3] The treatment of back pain patients can be both interesting and satisfying. Some people suffering from low backaches may be difficult since they suffer from frequent restricted spinal motion.[4] When motion is constrained, extension is restricted more than flexion. The reduced spinal extension can be caused by discomfort or stiffness and is

defined as either general (whole spine) or segmental (one or more segments) (one vertebral level). Patients with low back pain generally have problems with function and muscles coordination that stabilize the regions of the lumbar spine, particularly the back-extensor muscles. Men with good back extensor muscle endurance appeared to be protected from low back pain, according to Rebecca Conway.[23] Back discomfort can be caused by erector spinae tension and exhaustion. Positional release therapy and muscle energy techniques are two types of manual therapy that are commonly used to help people with pain and limited range of motion.[4-7] Positional release therapy (PRT) is a method of evaluating and treating the entire body by employing tender spots and a comfortable position to alleviate the related dysfunction. The tender point is used as a reference point, and the comfortable position is maintained. This minimally uncomfortable position is usually where the muscle is at its smallest length. The joint is returned passively to its neutral position after 90 seconds slowly in this posture. Both the intrafusal (muscle spindle) and extrafusal fibers shorten as a result of the muscle's protracted shortening. As a result of these alterations, there is a significant reduction in discomfort and an increase in functional range of motion.[8] The muscle energy method (MET) is an active approach that uses isometric contractions at 30% effort to relieve pain in patients. Muscle energy technique, according to Greenman, is a manual medical treatment approach in which the operator applies a separate counterforce in a regulated direction at varying levels of strength. Increase joint mobilization and extending tensed muscles is the goal. Because there is no pushing, this treatment has a very minimal risk of consequences and can be utilized in situations where the high-velocity low amplitude is contraindicated.[9-10] LBA can be caused by various factors, including inflammatory, innate, traumatic, and degenerative pain, as well as oncotic, metabolic, and organic pain. Muscle flexibility has a direct epidemiologically linked effect on other joint functions, and a reduced range of motion causes epidemiologic alterations that lead to joint function disease. Forward pelvic tilting is common during the pelvis transposition due to weaker or slack hamstring muscles when muscle alterations and posture are out of equilibrium. As a result of the greater stress placed on the spine while bending, a decrease in hamstring muscle flexibility increases the chance of injury. Lumbago, often known as LBA, is one of the most common conditions. Approximately 9-12 percent of the population (632 million) suffers from LBA at some point during the month. It begins between the ages of 20 and 40. Both men and women are affected in the same way.[11] Positional release technique, also known as strain counter strain, is an osteopathic manual therapy that aims to increase muscle flexibility by placing the muscle in a shorter position, as opposed to a lengthened or stretched position, to encourage muscle relaxation. The procedure entails moving the restricted joints and muscles in the opposite direction of the stretch or strain for at least 90 seconds. Any tissue implicated in the pathogenesis of somatic joint dysfunction has been recommended for therapy with PRT. PRT has been recommended for the treatment of chronic, subacute, and acute dysfunction. Hyperactivity of the myotatic reflex arc, which is induced by high gamma gain, is thought to be the reason for restricted movement. By placing the patients in a comfortable position for a brief amount of time. PRT teaches you how to manage pain and biomechanical dysfunction in a practical approach. They're also cognitively fulfilling since they don't force a solution on dysfunctional tissues; instead, they let pain, spasm, hypertonicity, and limitation resolve spontaneously.[12] Muscle Energy Technique is a collection of techniques of soft tissue manipulation that fall under the umbrella of manual therapy. Osteopath Fred Mitchell, Sr., first employed them and numerous researchers and clinicians are actively working on them now. This treatment technique is utilized to improve the system of myofascial and joints functioning characteristics. They can have an impact on the range of motion restoration in specific joints. They are used to treat shortened and weaker muscles, as well as limited joints and lymphatic drainage. These strategies have also been shown to have a pain-relieving impact in the event of certain locomotor system disorders in scientific studies. MET is thought to increase local soft tissue circulation and affect proprioceptive re-education. A crucial function is thought to be played by neurological and biomechanical mechanisms. Acute, subacute, and chronic diseases are all treated with METs. They are employed for a variety of purposes.[13-16]This study was conducted in order to focus on bringing effective treatment for low back ache using techniques that results in better and effective treatment for students in college especially focusing on hamstring tightness as it is the major reason and common in adolescents which results later phase complications.

2. MATERIALS AND METHODS

2.1 Participant

A total of 30 college-going students with hamstring tightness influenced with low backache with age group between 20-25 years. College-going students who did not undergo any hamstring injury at least 6 months before. Recreational athlete student with maximum traveling time.

2.2 Study design

This study was planned as a case series. Two physiotherapists were in charge of the project. The first physiotherapist evaluated the students at the time of treatment and immediately after the treatment program. The second physiotherapist applied the treatment program to the players.

2.3 Outcome Measures

2.3.1 Active Knee Extension Test (AKE)

The Active Knee Extension Test was used to assess hamstring muscle length and the range of active knee extension at 90 degrees.

- The subject was instructed about the assessment protocol.
- The subject was warmed up by mild active stretching.
- To determine the AKE, the subject was on supine lying with hip and knee flexing to 90 degree, one at a time.
- The subject was then asked to extend the knee more than 90 degree and hold.
- The knee and the leg extended are then measured with a goniometer placed on the lateral side of the knee where the hamstring tightness was measured.
- The final length was successfully recorded i.e. more than 90 degree and 180 degrees. [14]

2.3.2 *Modified Schober's Test*

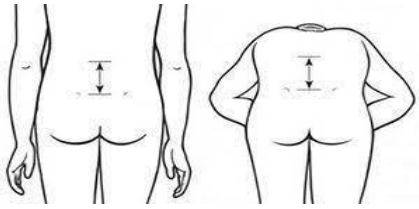

Fig 1: Modified Schober's Test

- Subject was asked to stand, the examiner marked posterior superior iliac spine (PSIS) on both sides.
- A horizontal line was drawn from the center joining both the marks
- 5 cm below the first line, a second line was drawn.
- 10 cm above the first line, another third line was drawn.
- Then the subject was instructed to flex forward attempting to touch his/her toes.
- Distance between the top and bottom line was measured by the examiner.

2.3.3 *Fingertip To Floor Test*

- Subjects were asked to stand.
- The subject was then asked to bend forward attempting to reach for the floor with the fingertips.
- Then the examiner measured the distance between the patient's right long finger and the floor using a standard measuring tape

2.4 Intervention

These 30 students underwent Muscle Energy Technique and Positional Release Technique treatment program following 4 weeks for 45 minutes per session where 15 students were treated with Muscle Energy Technique and the other 15 students were treated with Positional Release Technique along with hold – relax stretching to help in improving quality of life of students.

Fig 2: Fingertip to Floor Test

2.5 Training Program

There were 30 subjects selected by convenient sampling method according to inclusion and exclusion criteria. These 30 subjects were then divided into two groups i.e. 15 subjects in Group A and 15 subjects in Group B. Written consent was obtained from all the subjects that were clearly explained about the study. Both Groups A and B were included for Pre-Test and Post-Test assessment. Group A and Group B were trained according to the treatment program mentioned below. Group A was treated with Muscle Energy Technique along with the hold-relax technique for 45 minutes per session. Similarly, Group B was treated with Positional Release Technique along with the hold-relax technique for 45 minutes per session.

2.5.1 Group –A [Muscle Energy Technique]: Treatment Protocol for Group A

On the afflicted side, the patient fully flexes the hip in the supine position. The practitioner extends the knee that is flexed to the point of resistance (identifying the barrier). The therapist stands on the side of the leg which is treated, facing the head of the table, with the calf of the treated leg on his shoulder. When treating a patient's right leg, the calf rests on the therapist's right shoulder, while the therapist stabilizes the patient's extended unaffected leg with the right hand against the table. When assessing the barrier, the therapist's left-hand holds the treated leg's thigh to maintain stability as well as palpate for bind. The patient is requested to use the antagonists to the hamstrings to straighten and extend the knee while using 20% of the quadriceps strength. The therapist resists for 7–10 seconds. Instructions on how to breathe properly should be offered. If the condition is acute, the leg is then extended at the knee to its new hamstring limit (or minimally stretched if the problem is chronic), and the operation is repeated.

2.5.2 Group –B [Positional Release Technique]: Treatment Protocol for Group B

Medial hamstring – anteromedially. Position of treatment – The patient was supine lying on the table, with the extended afflicted thigh and abducted off the edge. The therapist bends the afflicted knee to around 40 degrees and then adducts or abducts the lower leg (usually abduction slightly, i.e., valgus force to the tibia). After that, the tibia was rotated internally or externally (usually external rotation). This painful spot occurs on the tibia's posterior, medial surface, near the semimembranosus and semitendinosus tendinous attachments. Anterior pressure was applied. The patient was supine on the table, with the extended afflicted thigh, and abducted off the edge. After that, the therapist flexes the afflicted knee to 40 degrees and performs modest adduction (Varus force) and notable tibial internal rotation. Lateral hamstring - The tendinous attachment of the biceps femoris was positioned on the posterior, lateral aspect of the fibular head, and pressure was applied.

2.7 STATISTICAL ANALYSIS

The data were evaluated by using paired 't'-tests. Statistical significance between pre and post-test values of Active Knee Extension Test, fingertip to the floor test, and Modified Schober's test for Group A and Group B was used to find the paired 't' test. Unpaired t-test was used to compare both the groups by using the

values of mean difference in Active Knee Extension Test, fingertip to the floor test, and Modified Schober's test. For all the outcome measures at pre and post-treatment in both the groups, arithmetic mean was calculated. Variation from means is seen by Standard deviation. Mean difference was calculated to see variation within the group.

2.7.1 Data Presentation

Table 1: Mean Difference and Standard Deviation of Group A and Group B for Active Knee Extension Test, Modified Schober's Test And Fingertip To Floor Test

MEAN DIFFERENCE				
GROUPS	AKE		Modified Schober's Test	Fingertip to Floor Test
	LEFT	RIGHT		
GROUP A	20.67	25.27	2.60	5.00
GROUP B	31.33	33.40	3.87	7.33
STANDARD DEVIATION				
GROUP A	6.42	5.82	0.91	1.96
GROUP B	7.90	6.20	0.74	1.95

Table 2: Comparison of the Paired 't' Test, Unpaired 't' Test, and Table Value Between Group A and Group B

CALCULATED PAIRED ' T' VALUE						
GROUPS	AKE		MODIFIED SCHOBER'S TEST	FINGERTIP TO FLOOR TEST	TABLE VALUE	SIGNIFICANCE
	LEFT	RIGHT				
GROUP A	12.46	16.80	11.06	9.86	2.15	SIGNIFICANT
GROUP B	15.36	20.88	20.15	14.55	2.15	SIGNIFICANT
CALCULATED UNPAIRED ' T' VALUE						
BETWEEN GROUPS	4.06	3.70	4.17	3.26	20.5	SIGNIFICANT

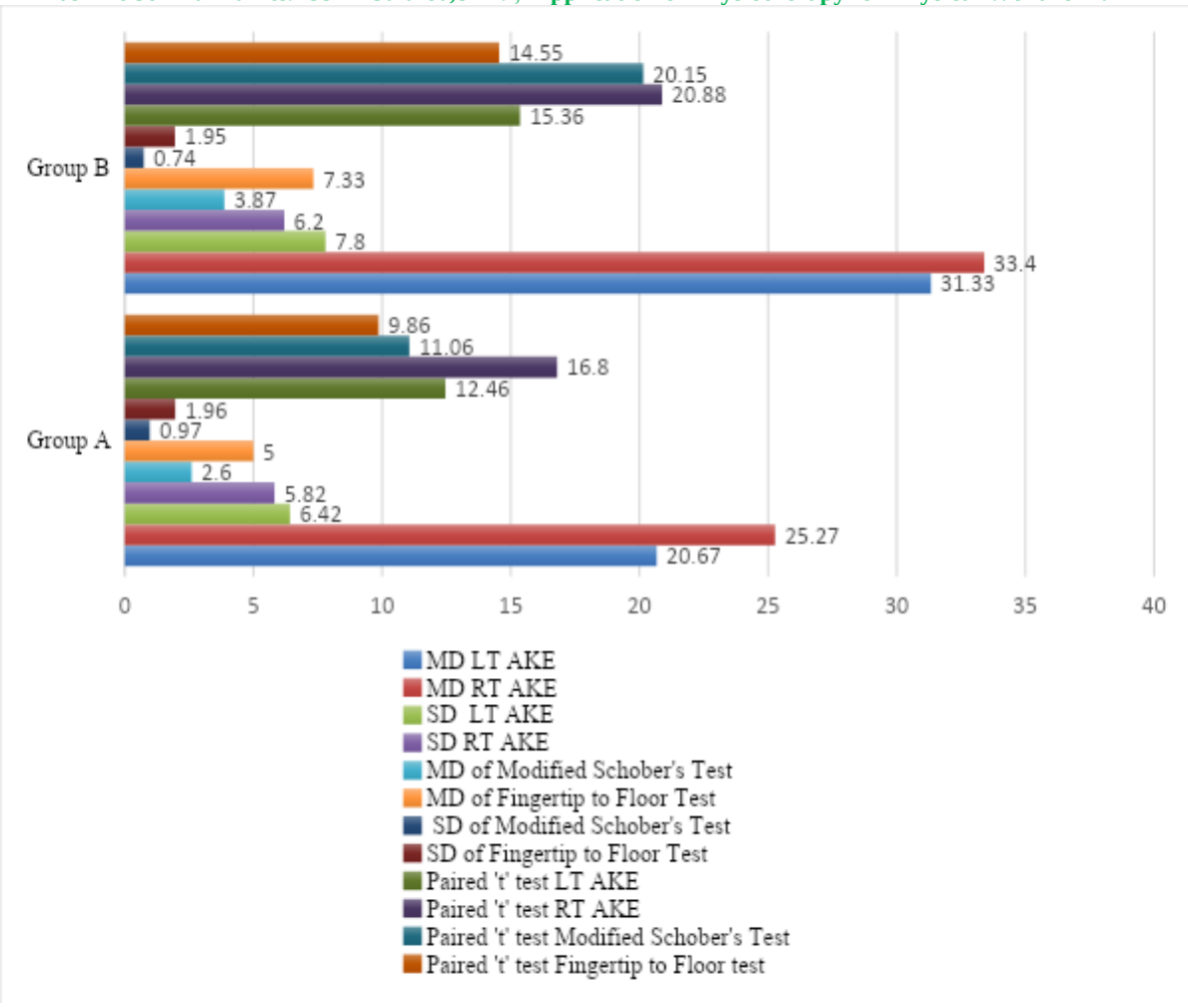

Fig 3: Statistical Data Presentation

MD: Mean Difference, SD: Standard Deviation, AKE: Active Knee Extension, Rt: Right, Lt: Left

3. RESULTS

The study comprised 30 students, college-going students. All 30 students were positive in the diagnostic test for college-going students. The median time interval between Active Knee Extension Test, Modified Schober's Test, and Fingertip to Floor Test were applied pre and post-therapy was 4 weeks. Among 30 students, 15 were treated with Muscle Energy Technique and 15 were treated with Positional Release. The pre-and post-value were assessed for Group A by Active Knee Extension Test for both left and right leg, Modified Schober's Test, Fingertip to Floor Test. The mean difference values are 20.67/25.27, 2.60, and 5.00 respectively. The Standard deviation is 6.42/5.82, 0.91, and 1.96 respectively. The paired't' values are 12.46/16.80, 11.06, and 9.86. For a 5% level of significance, the paired't' test value exceeds table value 2.15. The pre-and post-value were assessed by Active Knee Extension Test for both left and right leg, Modified Schober's Test, Fingertip to Floor Test in Group B. The mean difference values are 31.33/33.40, 3.87, and 7.33 respectively. The Standard deviation is 7.90/6.20, 0.74, and 1.95 respectively. The paired't' values are 15.36/20.88,20.15 and 14.55. For a 5% level of significance, the paired 't' test value exceeds table value 2.15. The calculated't' values by unpaired 't' test assessed by Active Knee Extension Test for both left and right leg, Modified Schober's Test, Fingertip to Floor Test were 4.06/3.70, 4.17, and 3.26. The calculated't' values were more than the table value 2.05 for a 5% level of significance at 38% of freedom.The paired't' values of Active Knee Extension Test for both left and right leg, Modified Schober's Test, and Fingertip to floor test have shown that Positional Release Technique has been more effective for college going students with a tight hamstring and decreased ROM in the lumbar trunk and pelvis ROM. There was an improvement found after

the treatment in the Lumbar Pelvis and Trunk ROM. So Positional Release Technique was more appropriate to use for aiming improvement in ROM more than Muscle Energy Technique.

4. DISCUSSION

While considering, improvement in hamstring muscle length and ROM in the lumbar, trunk, and pelvis ROM in college-going students. There was an effective and good improvement in college-going students. According to Sejal Sailor et al., 2018[17], it is concluded that MET, as well as PRT procedures, are beneficial in developing flexibility in the hamstring for healthy young individuals with normal and limited flexible hamstring based on the findings of this study. The change of percentage in ROM post two weeks of intervention was way more in the MET technique than in the PRT approach.[17]According to Mohamed MN et al., 2014[18], In individuals with chronic mechanical low back pain, the positional release approach is successful in lowering pain, functional impairment, and improving lumbar range of motion. The positional release technique improves mobility and quality of life by reducing joint and muscle discomfort, edema, and stiffness (D'Ambrogio and Roth, 1997). The analgesic impact of PRT, which resulted in decreased pain and improved back functions, could be linked to the increase in functional capacity for (CMLBP) patients in this study.[18]According to Emad Eldin Mohamed Abd Elatieflbraheem et al., 2017[19]. Even though the results makes known that conventional therapy shows an improved statistical significant over positional release technique in terms of functional disability, the severity of pain, lumbar range of flexion and extension range of motion, positional release technique, and conventional therapy may be useful therapeutic modalities in the improvement of pain severity, functional disability, and lumbar flexion and extension range of motion. Positional release techniques along with other modalities can be used to attain better results. This study was conducted to assess the effects of modified hold-relax stretching versus static stretching in improving hamstring muscular flexibility.[19] According to Hashim Ahmed MPT et al., 2015[20], Both modified hold-relax stretching and static stretching are effective approaches for improving the flexibility of the hamstring, according to the findings of our study. Static stretching increases the elasticity of the noncontractile viscoelastic component, while flexibility is improved by modified hold-relax stretching, relaxing the contractile component of the muscles. As a result, our research found that each of these strategies contributes equally to muscular flexibility improvement. Our findings are consistent with those of other research that have found comparable results. The effects of autogenic inhibition may be a plausible mechanism for improving hamstring range of motion. The function of the Golgi tendon organs, which detect variations in length as well as tension, is required for autogenic inhibition. Both static and PNF hamstring stretching procedures induce tension in the antagonists. This study investigated the reliabilities and validities of four clinical procedures for evaluating lumbar curvature and pelvic angle.[20] According to RAY G. BURDETT et al., 1986[21]. Each approach has advantages and limitations that can affect the measurement's reliability and validity, as well as the instruments' simplicity of use. No one instrument was discovered to be better than the others. The measurement of lumbar curvature during stance or trunk flexion, as well as pelvic tilt during stance, was more reliable than the measurement of lumbar curvature during extension of the trunk. The superior surface of S1 and the inferior surface of T12 as external measurement validity benchmarks when used, we discovered that none of the equipment could accurately measure any of the positions. The equipment and processes utilized in this investigation could be improved to improve their reliability.[21] Even though, the analysis of the intergroup disclosed no differences between the therapies that investigated (except for the cervical posterior flexion movement), the analysis of the intergroup indicates a slight advantage of the MET + Trigger Point Therapy (TPT) combined in the context of the parameters studied, according to Micha Wendt et al., 2020[22]. Positive changes in spine mobility of cervical and the PPT index following one MET + TPT treatment indicates the need for more research on groups of patients with musculoskeletal dysfunctions of effectiveness and longer treatment duration to clinically assess the effectiveness of combined therapy effectiveness.[22] In the final step of my thesis research, I discovered that Positional Release Technique not only improves the lumbar, trunk, and pelvic range of motion, but also lengthens the hamstring muscle and effectively relieves low back pain.

Positional Release Technique is more beneficial than Muscle Energy Technique for hamstring muscle tension impacting low back pain, according to this study. When it comes to enhancing ROM in the lumbar, trunk, and pelvis regions, Positional Release Technique outperforms Muscle Energy Technique.

5. CONCLUSION

The alternate hypothesis is accepted based on the findings, and the study might conclude that there is a difference significantly between Positional Release Technique and Muscle Energy Technique. The substantial effect of the Active Knee Extension Test, Modified Schober's Test, and Fingertip to Floor Test on Range of

Motion in the Lumbar, Trunk, and Pelvis for college students with hamstring tightness influencing Low back pain was examined.Finally, the study conducted concluded that Muscle Energy Technique and Positional Release Technique both showed effective treatment for low back ache. Where, Muscle Energy technique was more effective than Positional Release Technique and gave better results when compared. It was observed that subjects not only attain pain relief but also increase in range of motion in lumbar, trunk and pelvis.

6. CONSENT

Written informed consent was obtained from the parents of the students.

7. ETHICAL APPROVAL

This study was conducted after getting permission from the Institutional Ethical Committee and as well informed consent was obtained from the patients for conducting this study and for the publication of this research work.

8. ACKNOWLEDGEMENT

My sincere thanks to the Chairperson of the Ethical Committee, Secretary, and the members for their guidance and support.

9. CONFLICT OF INTEREST

The authors have no conflict of interest.

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Effectiveness of Active Release Technique and Cupping Therapy with Strengthening Exercise to Fix Internal Snapping Hip Syndrome

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Abstract: Snapping hip syndrome, also known as coxasaltans, is a condition characterized by audible "snap" or "click" sounds in or around the hip, as well as a snapping feeling, while the hip is in motion. This study was designed to investigate the effectiveness ofcombining active release techniques and cupping therapy with strengthening exercises, females with internal snapping hip syndrome can reduce their low backache. Internal snapping hip syndrome occurs when the iliopsoas tendon snaps over underlying bony prominences such as the iliopectinal eminence or the anterior section of the femoral head. Internal coxasaltans affect 5% to 10% of the population, and it appears that the prevalence is slightly higher in women than in males. . This study's designed A total of 17 females were taken, based on inclusion criteria 12 females were selected and 5 females were excluded by convenient sampling method. The subject received active release technique and cupping therapy with strengthening exercise for eight weeks. The study sample comprised of 12 female patients included 5 subjects were excluded. The pre and post-test values were assessed, the mean difference value in lower extremity functional scale 11.07 and visual analog scale 2.27. The standard deviation value in the lower extremity functional scale is 2.77, Visual analog scale is 1.12. The paired 't-test value in the lower extremity functional scale is 15.47, visual analog scale is 7.85. There is a significant in active release technique and cupping therapy with strengthening exercises in females with internal snapping hip syndrome. The result of the study showed that active release technique and cupping therapy with strengthening exercise was shown to improve the subjects who participates in this study. So, it was concluded that active release technique and cupping therapy with strengthening exercise gives more effect on females with internal snapping hip syndrome.

Keywords: Active release technique, cupping therapy kit, strengthening exercise, visual analog scale, lower extremity functional scale.

1. INTRODUCTION

Snapping hip syndrome, also known as coxasaltans, is a disorder in which an audible "snap" or "click" noise is heard in or around the hip and is accompanied by a snapping feeling when the hip is moved. When a muscle or tendon (the strong tissue that connects muscle to bone) moves over a bony protrusion in your hip, it causes a snapping sensation. Bursitis, a painful swelling of the fluid-filled sacs that cushion the hip joint, can occur as a result of a breaking hip.[1-2.] Extra-articular and Intra-articular hips are the two types of snapping hips that have been identified (least common). Extra-articular snapping hip syndrome was subsequently subdivided into external and Internal snapping hip syndromes. During hip motions such as flexion, extension, external, or internal rotation, the iliotibial band moves along the greater trochanter of the femoral head, creating an external snapping hip. The iliopsoas tendon snaps over bony prominences beneath the skin, such as the iliopectineal eminence or the anterior section of the femoral head, causing internal snapping hip syndrome. Internal snapping hip syndrome, also known as coxasaltans internal type, is characterized by a snapping sound that occurs during hip flexion and extension. Patients who are having snap hip syndrome were followed by painkillers such as aceclofenac followed.[3] Internal hip snapping can be diagnosed by ultrasonography. This method has substituted fluoroscopy because of its quick and noninvasive identification of the psoas and iliopsoas tendons, as well as other hip capsule movements.[4-5] Internal coxasaltans affect

around 5% to 10% of the population; the prevalence appears to be slightly higher in women than in men. Repetitive hip motions are prevalent in competitive and recreational ballet dancers, weight lifters, runners, and soccer players. Nearly 90% of those affected reported symptoms of internal snapping hip syndrome, with 80% having bilateral involvement. External hip rotation and abduction at or above 90 degrees are two actions that cause internal snapping.[6] Repetitive hip flexion / external rotation of the hips as a result of prolonged sitting Internal snapping hip is caused by two actions: external hip rotation and abduction at or above 90 degrees. Hip flexor weakness, trauma, tendon thickening, expanded bony prominence, and tilted pelvis are the main reasons for internal snapping hip. Athletes, cyclists, ballet dancers, gymnasts, horse riders, track and field athletes, soccer players, and extreme weightlifters are more likely to experience internal hip cracking. People between the ages of 15 and 40 are most likely to snap their hips. Overuse injuries such as hip flexion and external rotation are common. The illiopectineal eminence is crossed by the iliopsoas tendon (bony protrusion of pelvic bone). These movements cause internal cracking due to strain between two structures, Internal snapping hip syndrome is normally painless, although it can progress to tendinitis, which is inflammation of the hip flexor tendon and can be painful. Overtraining was the most common cause of Coxa saltans (internal snapping hip). Three cases in elite athletes who had ultrasound treatment and management were discovered by Wahl C J, Warren RF, Adler RS, Hannafin JA, and Hansen.7 Clark R Konczak's (2005) research revealed that a marathon runner with low backache and left hip pain, as well as a "popping" in the front of the hip. For two weeks, the patient received myofascial release to the psoas muscle twice a week. The patients were taught PNF exercises for the psoas muscles, and after three weeks, the subject was reported to be pain-free in his hip and back, with no popping in his left hip.[8] Active release techniques (ART) is a soft tissue method that focuses on relieving tissue tension by eliminating fibrosis or adhesions that can occur in tissues due to overuse.[9] The fundamental goal of ART is to alleviate muscle, tendon, ligament, fascia, and nerve symptoms. The primary goal of ART is to restore ideal soft tissue texture, resilience, and functioning by restoring unrestricted soft tissue mobility and releasing entrapped nerves, vasculature, and lymphatics. The active release approach is better at reducing constraints that limit the complete range of motion and restoring full function and performance to injured soft tissues. This approach can lead to considerable improvements in power, strength, and flexibility in athletes[10-11]. Cupping therapy is the most efficient way to remove toxins from body tissue and organs. To create suction, the therapist places specific cups on the skin. Vacuum cupping, hijama cupping, horn therapy, and other terms have been used to describe it. Cupping therapy is primarily used to promote blood flow to muscles and tissues while also reducing stagnation. The process of delivering oxygen and nutrients to the cells is known as cellular respiration. Muscles that have become tense are loosened. Adhesions and knots are loosening. Lifting the connective tissues, releasing lymphatic node obstructions, and improving lymph flow Excess fluids and poisons such as lactic acid are released and drained from the tissues and cells. Bringing inflammation from deeper tissues to the skin's surface so it can heal the peripheral nervous system is stimulated and then calmed. Avoid chronic congestion. Cupping therapy is recommended for both male and female patients, as well as those who are afflicted. It stimulates skin metabolism, enhances the function of the sebaceous gland and sweat glands, and improves skin resistance.[12]Strengthening exercise, our muscles' capacity to create tension when exercising is referred to as muscular strength. Resistance training, often known as strength training, is a sort of exercise that is designed to strengthen muscular tissue. Strength training can be done at a high or low intensity depending on your goals. When compared to other physiotherapy methods, eccentric strengthening exercises were shown to be the most efficient in reducing pain and enhancing function by Andres et al., who conducted a comprehensive evaluation of tendonitis therapies.

2. MATERIALS AND METHODS

2.1 Participation

This study had a total of 17 female subjects, with 5 of them being excluded based on exclusion criteria. Females between the ages of 18 and 23 were chosen based on inclusion criteria, Female athletes are taken asFemales suffering from low back pain, Females who sit for long periods, VAS scale score at and above 7, difficulty with daily activities at lower extremity functional scale . Exclusion criteria, females with weak hip flexors, Females who have had hip replacements, Diseases such as cardiac, viral, and epilepsy in the past, Subjects who use external devices.

2.2 Study design

This study was a Quasi-Experimental design study. A convenient sampling method was used to select the subject. The study was conducted for 8 months with treatment duration. The study was done outpatient department, Nandha College of physiotherapy, Erode, Tamil Nadu, India.

2.3 Outcome measures:

2.3.1 Visual Analogue Scale:

A Visual Analogue Scale (VAS) is a method for assessing a characteristic or attitude that is considered to range throughout a range of values but is difficult to measure directly [11]. It's commonly used in epidemiologic and clinical investigations to determine the severity and frequency of certain symptoms [13]. The VAS (Visual Analogue Scale) is a single-dimensional pain intensity scale that is commonly used in adult populations.

2.3.2 Lower Extremity Functional Scale:

The lower extremity functional scale (LEFS) is a reliable patient-rated outcome measure for measuring lower extremity function (PROM). Binkley et al. (1999) created it for a group of people who had a variety of musculoskeletal problems [14]. For each action listed, patients choose a response from the following scale:

1. Difficulty or inability to do an activity
2. A Fair Amount of Difficulty
3. Difficulty Level: Moderate
4. A Modest Amount of Difficulty
5. There Isn't Any Difficulty

The maximum potential score is 80, signifying excellent performance. The lowest possible score is 0 points, which indicates a very poor level of function.

2.4 Intervention

For the first week, each participant received ART (5 to 10 minutes on alternate days) and cupping treatment (5 to 10 minutes twice weekly); for the second week, ART and Cupping therapy, as well as Strengthening exercises, were given. Training program: Subjects were selected by a convenient sampling method.12 subjects who fulfilled inclusion and exclusion criteria were selected out of 17subjects,12 subjects were included, 5 subjects were excluded because of unable to continue the session. The protocol for therapy was described to the individuals, and those who met the requirements signed a written informed permission form. This group was involved in pre-test and post-test assessment. For the first week, each participant received ART (5 to 10 minutes on alternate days) and cupping treatment (5 to 10 minutes twice weekly); for the second week, ART and Cupping therapy, as well as strengthening exercises, were given.

2.5 Treatment Procedure

The subjects were selected through inclusion criteria and informed consent was taken from the subjects. The subjects were explained about the treatment and positioned comfortably, Proper instructions and safety measures was given to subjects about their treatment procedure. The special test may include. In the Stinchfield test, the participant is asked to flex the hip completely while the examiners apply a resistance force while lying supinewith the hip flexed at 30 degrees. Other tests like the iliopsoas stress test and the Thomas test all suggest pain in the anterior groin.

ACTIVE RELEASE TECHNIQUE

The participants must be lying down in a supine position, with the therapist standing next to them. The iliopsoas tendon was palpated using the index, middle, and ring fingers. For 5 to 10 minutes on alternate days, active release methods (kneading) were applied to the iliac and psoas major muscle groups. The therapist uses manual treatment to apply compressive, tensile, and shear forces to treat repetitive strain injuries, cumulative trauma injuries, and continuous pressure tension lesions. As the therapist applies deep tension to the uncomfortable region, the patient is encouraged to actively move the injured spot from a shorter to a lengthened condition. placing a contact point near the lesion and pushing the patient to move in such a way that soft tissues, including nerves, ligaments, and muscles, flow longitudinally beneath it. CUPPING THERAPY**,** Subjects were provided detailed information regarding the operation as well as any post-treatment markings or scars on their skin. The subjects must be laying on their backs in a prone position. Position of the therapist: not related to the issue. The therapist creates a vacuum using a rubber pump, which causes the skin to rise. Cups are put on regions with a lot of muscles, which dilates the blood vessels, improves blood circulation, and relaxes the low back. Cups are inserted into the skin and left there for 5-10 minutes. To avoid irritation, the individuals were instructed to use a moisturizer or antimicrobial cream after the operation. Strengthening exercises**,** Daily Adjustable Progressive Resistance Exercise The

DAPRE method is a four-set system with a repetition maximum range of five to seven repetitions. DAPRE allows patients to exercise to their full potential while taking into account daily variations in their strength levels. Warm-up sets 1 and 2 are commonly used, whereas peak effort sets 3 and 4 are commonly used.

- Glute loading: Have the individual lie down on their back and gently pull their knee to their chest. Wrap a resistance band around the bottom of their foot and hold it in front of them as the therapist stands nearby. Now, while lowering and straightening the leg without allowing the hip to cause snapping, press the resistance band with your foot for 20 repetitions for three sets.
- Isometric; Have the individual lie down on their back, then raise their knee to their chest, lower, then straighten their leg. Place your leg in the position where the snap is most likely to happen. Place your palm on your knee and push down as hard as you can without letting your leg drop 10 times for 5-10 seconds each time. The therapist stands next to the patient.
- Unsupported leg drop; Ask the subject to lie down on your back now bring both knees up towards your chest, Slowly lower and straighten your leg without allowing the hip produces a snapping sensation Perform 20 repetitions with 3 sets.
- Resistance to the full range of motion; have the individual lie down on their back with a resistance band wrapped around both feet. Maintaining both knees straight, steadily lift and drop the leg without allowing the hip to snap. Complete three sets of 20 repetitions.
- Address pelvic rotation: Lie down on your back with both knees pointed up at the ceiling. Pull your leg back into the hip socket by elongating the knee (non-snapping side) towards the sky (snapping side). Maintain this posture for the duration of the workout. Slowly drop the leg to the side, making a snapping noise while keeping both knees looking upright.

2.6 STATISTICAL ANALYSIS:

A paired't' test was used to assess pre-test and post-test values for the lower extremity functional scale and visual analog scale.

Table 1: Mean Difference, Standard Deviation between Lower Extremity Functional Scale and Visual Analog Scale

Parameter	Mean difference	Standard deviation	Paired 't-test	Table value	significant
Lower extremity functional scale	11.07	2.77	15.4	2.15	significant
Visual Analog scale	2.27	1.12	7.85	2.15	significant

This above Statistical data presented between LETS and VAS. The data were evaluated by using paired 't' test. The paired t test was used find out the statistical significance between parameters. And find the mean differences, standard deviation and paired 't' test for pre and post test values of LEFS and VAS. Mean difference values of LEFS was 11.07 and visual analog scale was 2.27. Standard deviations of LEFS was 2.77 and visual analog scale was 1.12. Paired 't' test value of lower extremity functional scale was 15.4 and visual analog scale was 7.85. Both the paired 't' test values above the table value and shown significant.

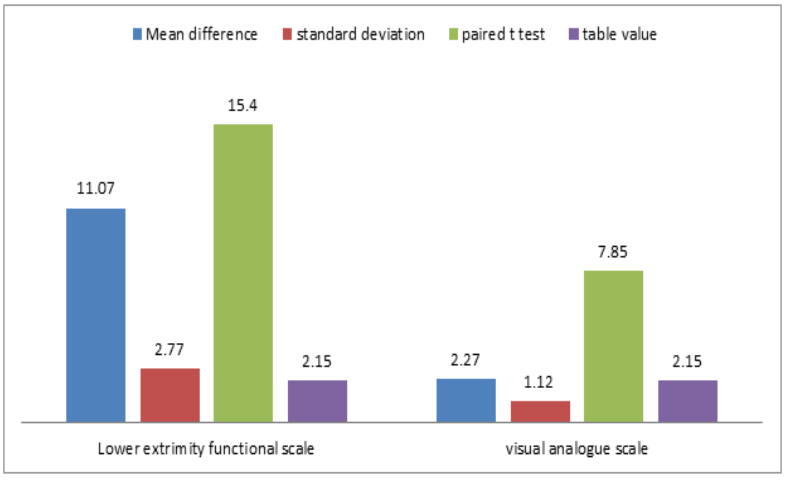

Fig 1: Graphical Presentation of Mean Difference Value, Standard Deviation Values for Lower Extremity Functional Scale, Visual Analog Scale.

Graphical plotting shows that analysation of mean difference, standard deviation and paired 't' test values and significance value for Lower Extremity Functional Scale and Visual Analog Scale. And values are calculated with the hip of pre and post value.

3. RESULT

Five people were eliminated from the research sample of 12 female patients. The pre-and post-test readings were used to calculate the mean difference value on the lower extremity functional scale of 11.07 and the visual analog scale of 2.27. The lower extremity functional scale has a standard deviation of 2.77, whereas the visual analog scale has a standard deviation of 1.12. On the lower extremity functional scale, the paired test result is 15.47, whereas the visual analog scale is 7.85. The computed "t" values were higher than the 2.15 values in the table. There was a significant change. In females with internal snapping hip syndrome, the active release method and cupping treatment with strengthening exercises show improvement.

4. DISCUSSION

The present study investigated the effectiveness of the active release technique and cupping therapy along with strengthening exercises to fix internal snapping hip syndrome. There were 15 subjects in the group. The study comprised of subjects aged between 18-23 years.The procedure was done for 8 weeks. The effectiveness of treatment was measured by There were 15 subjects in the group. The study comprised of subjects aged between 18-23 years. The procedure was done for 8 weeks. The effectiveness of treatment was measured by the lower extremity functional scale and visual analog scale. The pre and post-test values were analyzed statistically. The results obtained after the data analysis in this study did not support the null hypothesis. While consideration of reducing the pain in patients with internal snapping hip I found there was an effective and good improvement. Regular hip-strengthening exercises can reduce risk factors in conditions with inactive people in this study the exercises program had resulted in a significant decrease in subjects' low back pain with internal snapping hip, according to the result of paired "t" test independent response to pain in the low back showed a strong response to the effect of cupping therapy. The study proved that the effect of active release and cupping therapy with strengthening exercise is more effective for patients with low backache. Journal in Br J Sports Med, et al,.2007[15], Bicyclists frequently complain about low back pain. We discuss the example of a professional cyclist who suffered from low backache and had his symptoms cured after being diagnosed with internal snapping hip syndrome. This hip syndrome is a painful iliopsoas tendon lesion that occurs when the femur is extended from a flexed posture and the tendon snaps over the iliopectineal eminence or anterior femoral head. This is the first study we've seen that mentions this syndrome as a possible cause of low back pain in a competitive cyclist.[15]According to Sarah Wood and J Bodywet.al.2020[16], dry cupping showed a substantial impact on pain reduction in low back pain in 21 randomized controlled studies (MD, 19.38; 95 percent CI,-28.09 to-10.66). In individuals with non-specific low back pain, dry cupping treatment was found to be beneficial in lowering pain. Due to the low quality of intermediate data, conclusions on the effectiveness and safety of dry cupping for musculoskeletal discomfort and range of motion could not be drawn.[16] Robb A, et al., discussed about the immediate effect on pain threshold using active release technique on adductor strains who have a difficulty with daily

activities.[10]Journal of the Korean society of integrative medicine 2020[17], Active release techniques were given to subjects (n=15) for 30 minutes sessions occurring 2 times a week over 6 weeks period, significant decreases in their pelvic tilt and pelvic rotation after therapy ($p<.05$), VAS scales used to measure the pain. Active Release Technique is considered to be more effective in improving pelvic tilt and pelvic rotation.[17] Research done by Kristian Thorborg et al. 2016[18], Female individuals aged 24 were engaged in a hip flexor strength training program that lasted six weeks and consisted of three 10 minute sessions per week with elastic bands as external loading. A blinded assessor used a reliable test protocol to quantify hip flexor muscle strength, which improved by 17 percent (p0.001). This isometric hip flexor training regimen appears to have promise for future prevention and treatment of acute and chronic hip-flexor injuries, such as acute rectus femoris injuries and long-term iliopsoas discomfort and impingement.[18] Howitt, S.,et al investigate the conservative treatment of Trigger Thumb using Graston Techniques and Active Release Techniques on adductor flexibility.[11]Al-Bedah et al. Investigate and given the significant effect on the medical perspective of cupping therapy with their effects and mechanisms of action.[12]Females with a greater hip flexor, extensor, and abductor participation in strengthening programs may help to improve their Star Excursion Balance Test (SEBT) balance scores, as a measure of their neuromuscular control, and influence their ACL and lower extremity injury risk, according to Jatin P. Ambegaonkar et al. (2014).[19]

5. CONCLUSION

The study group consist of 12 female subjects who were assigned by convenient sampling method accordingly. Based on the result, the alternate hypothesis is accepted and also the study could be concluded that there is a significant effect on active release technique and cupping therapy with strengthening exercise for internal snapping hip syndrome.so, it was concluded that active release technique and cupping therapy with strengthening exercise was more effective for patients with internal snapping hip syndrome.

5. LIMITATIONS

This study has been conducted on small sized sample only.
This study took shorter duration to complete.

6. RECOMMENDATIONS

A similar study may be extended with larger sample.
The future study can be compared with various exercises.
The future study may include male candidates also.

7. CONSENT

Written informed consent was obtained from the patients.

8. ETHICAL APPROVAL

This study was conducted after getting permission from the Institutional Ethical Committee and as well informed consent was obtained from the patients for conducting this study and for the publication of this research work.

9. ACKNOWLEDGEMENT

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10. CONFLICT OF INTEREST

The authors have no conflict of interest.

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SP-3

Effectiveness of Lion's Breathing and Box Breathing Exercises in Improving Oxygen Saturation and Academic Performance in School-Going Children

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Abstract: Slow learners progress at a slower rate than their classmates. They do not, have an impairment that necessitates the use of special education. In youngsters, oxygen therapy improves memory, which is an important component of learning and academic achievement. As a result, oxygen saturation can have an impact on learning, for example, if you're looking for a unique way to express yourself, increasing oxygen saturation in a child's brain can boost brain cell activity, which can lead to improved academic performance. A Quasi-experimental study with a sample size of 185 healthy school students was taken based on inclusion and exclusion criteria and considered as a single group by a convenient sampling method. This group received lion's breathing and box breathing exercises for 30 mins per day for 4 days of a week for 6 months.Based on Pulse Oximetry and Academic Performance Rating scale (APRS), the mean difference of pre-test and post-test values for pulse oximetry is 0.88 and that of APRS is 3.59. The standard deviation values are 0.6 and 3.73. The standard error values are 0.46 and 0.2. The Paired 't' test values 19.18 and 12.65 respectively indicated significant improvement in oxygen saturation and academic performance through lion's breathing and box breathing exercises.The result of the study showed that the oxygen saturation was less in slow learners and high in good learners. It also concluded that the oxygen saturation and academic performance were co-related. Low oxygen saturation in slow learners had been improved through breathing exercises. Hence, As a result, lion's breathing and box breathing exercises boost oxygen saturation while also improving academic performance in students.

Keywords: Lion's Breathing, Box Breathing, Pulse Oximetry, Academic Performance, Learning, Slow Learners, IQ, Oxygen Saturation.

1. INTRODUCTION

Compared to other students of their age group, slow learners learn more slowly. But they don't have a disability requiring special education.[1] Research works by Moss MC and Scholey showed that memory which is a vital part of learning and academics is enhanced by oxygen administration. This showed improvement in academic performance by enhanced oxygen saturationin school-going children. So, oxygen saturation can play an important role in learning and academics.[2] Research done by Feba Sara Oommen concluded that oxygen saturation and academic performance are co-related in school-going children. It also concluded that slow learners had less oxygen saturation compared to good learners and thus, their academic performance is also influenced by oxygen saturation.[3] Michael S Urschitz (2005) stated that nocturnal oxygen saturation and academic performance are significantly co-related. He conducted this trial in a community of children (Sample) who studied mathematics.[4] Slow learners are not 'disabled' students (or) mentally impaired or retarded students. They are only students with below-average academic performance due to less cognitive abilities than others. These students cannot cope up to the level of other students in their classroom.[5] Slow learners do not require special education like differently-abled children. They only learn slowly compared to other students in their class. The developmental stages like communication skills, memory skills, and social interaction is as thesame as the other children, but they perform it a little slower than others. Slow learners

have low thinking capacity and intelligence which is below average.[1] Around 8 percent of the total school population are slow learners and they have an IQ of approximately about 76-89.[6] Burt (1937) stated that the term 'backward' or 'slow learners' is for students who cannot perform up to the level and meet the expectations like other students of their age group.[6] Jenson (1980) stated that slow learners are students with I.Q of about 80-90 and are classified as 'dull normal'. They are usually slower than their peers and the lessons taught to them are generally understood slowly.[6] Slow learning can be due to several reasons. It can be due to socio-economical or socio-cultural problems in the society they had been raised in, any past experiences in the classroom which are tragic, or lack of interest by them. Children who are diagnosed as learning-disabled learn slower than others.[7] Several internal and external factors can also affect the student's academic performance. Some of them are when family or the society didn't give any attention to students and when students are affected by inferiority complex when they fail an exam and are termed "Incapable and Useless" by their teachers. Other factors include family-related factors, school-related factors, teacher-related factors, and society-related factors and the students are also responsible (Student-related factors).But, as Feba Sara Oommen proved oxygen saturation is also related to academic performance, thus by increasing oxygen saturation academic performance can also be improved.[3] Findings by Hyun-Jun Kim (Jan 2013) suggest that high oxygen concentrations lead to enhanced cognitive function in the elderly. When blood oxygen saturation is increased, it decreases the heart rate, and thereby cognitive function including memory is improved when the administered oxygen is increased in its concentration and flow rate.[8]This is because the brain requires about twenty percent of the body's total oxygen and even more when the brain is in 'overdrive'. For the brain to function at its peak, it requires fuel which is nothing but oxygen. Oxygen helps in the transmission of nerve signals and messages throughout the body. Oxygen helps to remember and perform better on a test.[9] The brain is the human body's most metabolically active organ. It consumes up to 30% of the total energy used in the house. The oxidative breakdown of glucose produces this energy, which is then transferred to brain activity. The energy produced is used for a variety of activities depending on the cognitive demands of distinct tasks.[10] According to numerous brain imaging techniques, the intake of oxygen by distinct brain areas is influenced by a variety of cognitive tasks.[11-12] For normal functioning, the brain needs about 200 liters of oxygen every day. Because the brain is so sensitive to oxygen, a drop in arterial oxygen partial pressure (P_aO_2) can cause problems with attention and memory, both of which are important aspects of brain function[13-14]. Furthermore, it has been reported that acute hypoxia leads to more impairment in cognitive functioning compared to chronic hypoxia over a longer period.[15-17] Ho-Jun Seo's (2007) study, "The Effect of Oxygen Inhalation on Cognitive Function and EEG in Healthy Adults," looked into the effects of oxygen on brain activity. Verbal memory was greatly improved with the addition of 35% oxygen to the group. These findings imply that brain activity and cognitive performance may be affected by oxygen supply. Attention and long-term memory showed the greatest improvements.[18] Research carried out by Andrew B.Scholey from the Human Cognitive Neuroscience Unit at the University of Northumbria shows that mental performance can be greatly improved by inhaling pure oxygen and found that a dose of oxygen or glucose can improve performance on tasks that require great mental effort.Additionally, when the brain does not get enough oxygen, it may lead to a lack of alertness, memory, and mental focus.[19] Lion's breath is said to alleviate stress, eliminate toxins, and stimulate the throat and upper chest. In yoga, it is also known as 'Lion Pose' and this breathing practice is related to the thyroid and the fifth chakra (energy center). As per Yoga, the fifth chakra is for creativity, communication, and expression. This practice was shown to reduce disruptive behaviors. It also had an optimistic impact on expressive emotions, social engagement, physical performance, and the child's ability to self-regulate stress. It stretches the muscles and stimulates the nerves in the face, thereby relieving tension and improving circulation. It helps to feel empowered, focused and helps to boost confidence. Box breathing is a technique used when taking slow and deep breaths. It can heighten performance, focus, and concentration while also being a powerful stress reliever. It's also called four-square breathing. It calms down the nervous system by distracting the mind while counting to four and relieving stress in the body.

2. MATERIALS AND METHODS

2.1 Participation

A total of 185 healthy students were included in this study with an age group of 10 to 13 years of age. Inclusion criteria were as follows: Both male and female students with general body wellness, Exclusion criteria were as follows: Uncooperative children,hyperpyrexia, and students with cardiopulmonary disorders, mental retardation, and any other systemic illness.

2.2 Study design

This study is a Quasi-experimental design study. A convenient sampling method was used to select 173 healthy school students with an age group of 10 to 13 years studying V TO VIII standard and 12 students were excluded due to unwillingness. The study was conducted for 6 months. The study was done at Nandha Central School, Erode.

2.3 Outcome measures

2.3.1 Pulse oximetry

Pulse oximetry is a non-invasive method for determining blood oxygen saturation. It's a simple, painless test that determines how well oxygen is delivered to the body parts farthest from the heart, such as the arms and legs. Even minor variations in oxygen levels can be detected quickly by it. The efficiency with which blood transports oxygen to the extremities furthest from the heart, such as your arms and legs, is indicated by these values.[20-22]Before the breathing exercise session, the subjects' oxygen saturation was assessed with a pulse oximeter.It was carried out in the evenings when the students were not in class. The subjects were not learning or participating in any activities. Before the oxygen saturation was measured, the subjects were asked to wash their hands completely. This was done to minimize the spread of microorganisms that might cause readings to fluctuate. They were instructed to take a seat in a chair with a backrest. The pulse oximeter probe was inserted on the students' index fingers for one minute. Before and after the breathing exercise session, the oxygen saturation values were noticed and recorded in the same way. Finally, pre-test and post-test pulse oximetry values were recorded after the entire breathing exercise session.

2.3.2 Academic Performance Rating Scale (APRS)

Academic Performance Rating Scale (APRS) is a questionnaire that consists of 19 questions to be filled by the teachers.[23] The subjects who participated in the study were made to perform lion's breathing and box breathing exercises. The name and age are obtained from the subjects while other related assessment questions were obtained from their parents. A detailed assessment of every subject is done. On the way of initial assessment, a pre-score of APRS was obtained from their teachers and again a post-score of APRS was collected from their teachers after the study period of 6 months.

2.4 Intervention

The breathing exercise Program was carried out for 6 months for each student. Lion's breathing and box breathing was performed for half an hour per session in a week and 4 sessions in a play-way method for 6 months. Progression based on Daily Adjustable Progressive Resisted Exercise was done by increasing the repetitions 9 to 10 times per exercise.

2.5 Breathing exercise program

A convenient sampling method was used to choose subjects. A total of 173 students were chosen and put into a single group based on inclusion and exclusion criteria. The study was explained to the subjects, their parents, and their teachers in detail, and the parents of the subjects who met the criteria gave their written informed consent. This group was assessed both before and after the test. For a total of 6 months, lion's breathing and box breathing exercises were performed for 30 minutes, four times a week, with a 20 to 30-seconds rest break between each set of breathing exercises. Each breathing exercise was progressed by doing 9 to 10 repetitions per set.

2.6 Experimental group

2.6.1 Lion's breathing exercise

First, have the individual sit in the thunderbolt position (Diamond pose or adamantine pose). For comfort, the individuals were asked to kneel on the floor using a yoga mat. Instruct the participants to clench their knees and ankles and point their feet with their legs. Their big toes should connect and the bottoms of their feet should face upward. The individuals are then instructed to exhale while sitting back on their legs, with their thighs resting on their calves. Ask the participants to place their hands on their thighs and shift their pelvis back and forth until they are comfortable. Subjects were instructed to take a deep breathslowly as they prepared to sit up straightening their spine is a good way to start. The subjects were instructed to look forward with their chin parallel to the floor, relax their spine and head, and avoid arching their spine backward excessively. The subjects were then instructed to take a big breath in through their nostrils and widen their mouths and eyes as wide as possible. The subjects were then instructed to put their tongue out

and stretch it down their chin. When a flashcard with a picture of a lion is shown, urge the participants to exhale as strongly as they can with a "Ha" sound like a lion's roar. Repeat the process for 6 sets with a rest interval of 20 to 30 seconds per set.

2.6.2 Box breathing

When the therapist draws a vertical line in the paper, ask the subjects to breathe in slowly while counting to four. The participants were asked to feel the air entering their lungs. When a horizontal line is drawn to make a square, ask the subjects to hold their breath for 4 seconds. For four seconds, the subjects must not inhale or exhale. When another vertical line was drawn, the patients were instructed to exhale slowly through their mouth for 4 seconds. When the therapist draws the final horizontal line to complete the square, ask the subjects to relax for 4 seconds. Repeat the technique for six sets with a 20 to 30-second gap between each set.

2.7 STATISTICAL ANALYSIS

Data were analysed using an IBM Statistical Package for Social Sciences version 25.0. A paired 't' sample test was used to assess the oxygen saturation and academic performance by using pulse oximetry and the Academic Performance Rating Scale (APRS) in the experimental group. Before final analysis, data were screened for pre-test and post-test values in Pulse Oximetry and APRS.

Table 1: Data Analysis and Presentation for Paired Sample Statistics of Pulse Oximetry

		Mean	N	Standard Deviation	Standard Error Mean
Pair 1	V1	96.68	173	1.836	.140
	V2	97.55	173	1.542	.117

Table 2: Data Analysis and Presentation for Paired Samples Correlations of Pulse Oximetry

		N	Correlation	Sig.
Pair 1	V1 & V2	173	.951	.000

Table 3: Data Analysis and Presentation for Paired Samples Test of Pulse Oximetry

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Standard Deviation	Standard Error	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	V1-V2	.879	.603	.046	-.969	-.788	19.179	172	.000

Table 4:Data Analysis and Presentation for Paired Sample Statistics of Academic Performance Rating Scale

		Mean	N	Standard Deviation	Standard Error Mean
Pair 1	V1	59.03	173	9.253	.704
	V2	62.62	173	7.182	.546

Table 5: Data Analysis and Presentation for Paired Samples Correlations of Academic Performance Rating Scale

		N	Correlation	Sig.
Pair 1	V1 & V2	173	.927	.000

Table 6: Data Analysis and Presentation for Paired Samples Test of Academic Performance Rating Scale

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Standard Deviation	Standard Error	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	V1-V2	-3.590	3.734	.284	-4.150	-3.029	12.645	172	.000

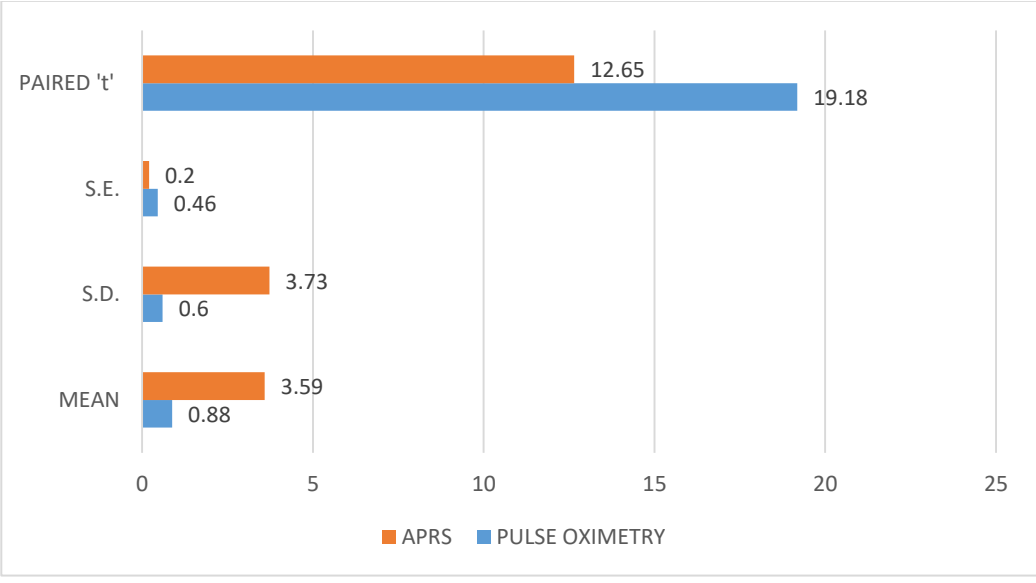

Fig 1: Mean, S.D(Standard Deviation), S.E(Standard Error) and Paired 't' test between Outcome measures for the Experimental group

3. RESULTS

The study sample comprised 185 healthy school students of 10 to 13 years of age. All subjects underwent cardio-respiratory assessment. The pre-test and post-test values were assessed by pulse oximetry and APRS. The mean difference values for pre-test and post-test of pulse oximetry and APRS are 0.88 and 3.59. The standard deviation value of pulse oximetry and that of APRS are 0.6 and 3.73. The standard error for pulse oximetry and that of APRS are 0.46 and 0.2 respectively. Paired 't' test values of pulse oximetry and that of APRS are 19.18 and 12.65 respectively. There is a significance of Lion's breathing and box breathing exercises in improving oxygen saturation and academic performance in school-going children.

4. DISCUSSION

The goal of our research was to see if lion's breathing and box breathing exercises may help school-aged students improve their oxygen saturation and academic performance. The goal of this research was to see if there was a link between oxygen saturation and academic achievement in regular school children. Moss MC and Scholey's research shows that inhaling oxygen improves memory, and as memory is an important component of academic achievement, they concluded that oxygen administration improves academic performance.[2] Kholoud H. Alruwaili (Sept 2020) stated that O2 saturation levels have a good impact on the academic population. His study concluded that the O2 saturation level is within the normal range for sample population.[24] Andrew B. Scholey investigated the effects of 100% oxygen administration and mental effort on heart rate and blood oxygen saturation in a study published in July 2019. These findings revealed that a high cognitive load resulted fromcirculatory oxygen uptake following oxygen inspiration.[19] Soon-Cheol Chung's (Apr 2008) memory performance investigation revealed that 30 percent oxygen administration increased word recall rates compared to 21% oxygen administration.[25] Higher oxygen levels improved cognitiveperformance and raised BOLD intensity in the parietal lobe, according to Bongsoo Lee et al.

research (Feb 2006).[26] In addition, according to Mi-Hyun Choi's research (Jan 2010), the accuracy rate on the visuospatial test was higher when 30 percent O2 was used against 21 percent O2. The increase in neural activation of subcortical structures like the thalamus and cingulate gyrus, as well as the cerebral cortex, was linked to an improvement in visuospatial task performance under 30 percent O2.[27] According to Hyun-Jun Kim et al. (Jan 2013), the provision of highly concentrated oxygen improves cognitive function in normal young adults.[8] Several studies are showing that breathing exercises can increase oxygen saturation and improve memory, cognitive function, focus, and relieves stress and anxiety in students. Abha Gupta, Seema Maira, and Smita Sinha's research (Jan 2015) investigate the use of breathing techniques to improve student's academic performance and outlines how teachers might promote the approach in their classrooms.[28] The

American Academy of Paediatrics published several research that found links between neurocognitive impairment and clinical disorders that cause chronic or intermittent hypoxia.[29] However, only a few studies assessed oxygen saturation or provided specific data on Spo2 levels. Nobody has looked into the ability of different pulse oximetry variables to predict neurocognitive impairment yet. But, Research published in 2005 by Michael S Urschitz found a link between nocturnal oxygen saturation and scholastic performance in Mathematics in a community sample of children.[4] However, Feba Sara Oommen (Sept 2020) investigated the link between oxygen saturation and academic performance in school-aged children during the day hours. As a result, she concluded that there is a link between oxygen saturation and academic achievement and that oxygen saturation was lower in slow learners compared to good learners.[3] The present study only monitored oxygen saturation for a short period, and the breathing exercise sessions lasted only 6 months. Future research could include tracking oxygen saturation for prolonged time, a large sample size, students of various ages, comparisons of different exercises, as well as a longer study period.

5. CONCLUSION

Based on the findings, an alternate hypothesis is accepted, and the study can be concluded that lion's breathing and box breathing exercises have a substantial effect on enhancing oxygen saturation and academic performance in school-aged children. When the substantial effect is examined, it is discovered that there is a link between oxygen saturation and academic achievement. The current study's findings demonstrate that slow learners' oxygen saturation was lower than that of good learners. Slow learners whose academic performance was harmed had a low level of oxygen saturation, which was enhanced by lion's and box breathing exercises.

6. CONSENT

Written informed consent was obtained from the parents of the students.

7. ETHICAL APPROVAL

This study was conducted after getting permission from the Institutional Ethical Committee and as well informed consent was obtained from the parents of the studentsfor conducting this study and for the publication of this research work.

8. ACKNOWLEDGEMENT

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9. CONFLICT OF INTEREST

The authors have no conflict of interest.

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Effectiveness of Pilates and Strengthening Exercises on Weight Loss and Quality Of Life among Hypothyroidism Postpartum Obese Women – A Comparative Study

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Abstract: Post-partum weight retention (PPWR) is being considered as a new public health crisis because of the association between PPWR and poor short- and long-term consequences for mothers and children, especially in those who are having hypothyroidism. Postpartum weight gain may affect women of reproductive age's long-term weight gain trajectory, increasing the chance of long-term overweight and obesity. Pilates is a type of exercise that is based on the Pilates technique (2020). It has a number of health benefits, including improved self-efficacy, mood, and sleep quality, as well as a higher quality of life. Strengthening exercise increases fat-free mass and is associated with a reduction in health risks.This study was done on 36 postpartum overweight and obese women, divided into Group A and Group B equally. Group A subjects performed Pilate for 12 weeks while Group B performed strengthening exercises for 12 weeks based on the 'SAID' principle. The paired t-test values show that both Pilates and strengthening exercises are effective in reducing weight in post-partum obese women. But Pilates is more effective than strengthening exercise on reducing weight in post-partum obese women. The unpaired t-test values show a more significant effect on weight loss in hypothyroid postpartum obese women group A than group B. Hence, this study shows more improvement in subjects with group A.There was a significant difference in effects obtained by the treatment techniques between Pilates and strengthening exercises. Both Pilates and strengthening exercise is effective to reduce weight and improve the quality of life. But, this study suggests that Pilates exercise is more effective than strengthening training in helping postpartum obese women loss weight and enhance their quality of life.

Keywords: Pilates, Strengthening Exercise, Obesity, BMI, Hypothyroid Postpartum Obese Women, Weight Loss.

1. INTRODUCTION

Substantial weight gain during pregnancy causes postpartum weight gain, which frequently worsens with subsequent pregnancies. Postpartum obesity is a major public health concern due to its link to negative short- and long-term effects on mothers and newborns.[1]At 6-12 months postpartum, typical weight retention ranges between 1.5 and 5 kg with significant variation across women.[2-5] Importantly, PPWR may influence women of reproductive age's long-term weight gain trajectory, increasing the chance of lifetime overweight and obesity. Excess weight retention after delivery, when compared to weight growth at other times in life, may be more hazardous since it is deposited in the center rather than peripheral location. High PPWR has been linked to an increased risk of negative maternal health outcomes, including insulin resistance, metabolic syndrome, and cardiovascular disease, as well as poor health consequences in children, contributing to the obesity intergenerational loop. Hypothyroidism is very common in pregnancy.[6] A complex relationship between body weight, thyroid, and metabolism. If thyroid problem results in low basal metabolic rate (BMR). It may result in weight gain.[7] Hypothyroid was controlled by drugs, but it was doesn't reduce weight. Exercise can reduce weight. Hypothyroidism is a condition in which the thyroid gland generates inadequate thyroid hormones and exposes them to the bloodstream. As a result, the metabolism

slows down. Fatigue, weight gain, and an inability to tolerate cold temperatures are all symptoms of hypothyroidism, often known as hypothyroidism.

1.1 Pilates Exercise

Pilates is a prominent mind-body exercise program that is taught all over the globe. This mind-body training regimen, originally termed "Contrology" by its originator, Joseph Pilates, is built on six essential principles: centering, concentration, control, precision, flow, and breath.[8,9] These ideas acknowledge the interdependence of physical and cognitive processes in achieving enhanced life satisfaction, self-esteem, and health. Recent studies have looked at the impact of Pilates-based exercise on a variety of health-related consequences, revealing increases in self-efficacy, positive mood, and sleep quality, as well as improved quality of life.

1.2 Strengthening Exercise

Muscle-strengthening exercises have been used to improve muscular strength, endurance, and fat loss. Muscle training can be done alone or in groups. Resistance exercise has a significant weight-loss effect. Resistance training reduces excess fat while increasing low-calorie mass, which is connected to a lower risk of disease. It aids in fat reduction by boosting the number of calories burned. [10-14] Muscle strengthening improves your capacity to do daily tasks and protects your body from damage. It also increases your metabolic rate, which burns more calories even when your body is at rest.

1.3 Health-Related Quality Of Life (HRQL)

Health-Related Quality of Life (HRQL) measurement, rather than psychological or clinical assessment, may be more useful for functioning and survival in both clinical and public health contexts. Numerous studies have found that those who are overweight or obese, as well as those who are underweight, have worse HRQL. [15] A few studies have found that people who are obese have poorer HRQL than persons of normal weight and that these lower scores exist even in people who do not suffer from obesity-related chronic conditions. [16-19]

2. MATERIALS AND METHODS

2.1 Materials

Yoga mat or treatment couch, Stott Pilates and mini Pilates ball, Foam, Towel, Weight cuff, resistant band, dumbbells and barbells, medicine balls, sandbags

2.2 Methods

2.2.1 Study Design:

This study was a Simple Random Sampling (SRS) method. In Simple Random Sampling, each conceivable sample of a different unit has an equal probability of being picked. This means that each person in the population has an equal probability of being chosen for the sample. Specifically, this study was a Cluster sampling method, it's one of the alternative methods of the Simple Random Sampling method. in the Cluster method, a sampling unit is a group of subunits. These groups (cluster) were selected randomly by giving equal chance to every cluster and then all the subunits in the selected groups (cluster) were completely enumerated.

2.2.2 Population

36 Subjects were selected in this study in the age group between 25 to 35 years old postpartum obese women. And there was 6 dropouts.

2.2.3 Study Setting

Out Patient Department in Nandha College of physiotherapy and Nandha Medical College and Hospital.

2.2.4 Sample Setting

The sample size is 36 subjects:

- Group A – 18 subjects
- Group B -18 subjects

2.3 Criteria for Selection

2.3.1 Inclusion Criteria

- Passive smoking pregnant women.

- Subjects between 25 to 35 years old.
- Nonathletic female.
- BMI of 26 to 36 kg\m^2
- Females with postpartum weight retention and hypothyroidism.

2.3.2 Exclusion Criteria

- Hypertension, Diabetes mellitus, contraindicated exercise such as multiple gestational diseases.
- BMI of subjects < 26 kg\m^2.
- Athletic or sportspersons.
- History of regular physical activity.

2.4 Procedure

The individuals were provided proper instructions, including the purpose, safety measures, comfort, safeguards, and psychological support. Subjects were given a thorough explanation of the study, and those who met the requirements signed a written informed consent form. The subjects were chosen using a practical sampling strategy. It is based on "SAID". The 36 participants who met the inclusion and exclusion criteria were divided into two groups: 18 in group A and 18 in group B.

2.4.1 Protocol for Group A

For 12 weeks, Group A individuals followed the protocol and conducted the following exercise routines daily.

PILATES

The exercise was given under the principles of Pilates-based on this study.

A) Principles

- Breathing
- Shoulder stabilization
- Spinal stabilization
- Pelvic stabilization
- Flow and coordination

Swimming

Lie down on your stomach, head down, pubic bone fastened to the mat, and inner thighs pressed together. Spread your arms out in front of you, palms down, and feet pointed in the direction you want to go. Raise and hold your limbs, chest, and face for one count. Raise your right shoulder and lower leg as well as left shoulder and lower leg off the floor without touching them by inhaling normally and exhaling gradually. Count from 1 to 10 while swimming, elevating your head higher and reaching farther with each count. Sit back on your heels for a lower back counter-stretch if necessary.

Crisscross

Lie on your back, palms up, with your knees placed against your chest palms stacked palm to palm behind your raised head. Gradually inhale and swivel to the left, aligning your right forearm with your left leg. Help sort your right leg forward, just above the floor. Exhale slowly and turn your body to the right, joining your left elbow to your right knee and extending your left leg. Repeat on the other side for a total of six twists

Jogging knees/Heel up

Begin sprinting with your legs raised to hip height while maintaining your elbows pressed to your sides and your abs sucked in and up. After around eight knee lifts, begin kicking the bottom with your heels without disrupting your stride, keeping your elbows locked and your chest elevated. After eight bottom kicks, either go on to the next exercise or complete another set, dropping the number of lifts and kicks to six, four, and then two.

Leg pulls

Sit tall, with your legs straight out in front of you and your hands securely clasped together (feet should be pointed). Place your hands on the mat's rear edges, palms down, fingers pointing inward. Raise your hips (A) and press your hands into your palms until your body forms a long diagonal line from your head to your heels. Inhale slowly while raising your right leg as high as it will go without shifting your weight or lowering your bottom (B). As you place your foot back on the mat, softly exhale while maintaining your chest wide. Repetition the exercise with the opposite leg. Try to raise your legs and hips up and up and up with each round.

Plank Jacks

Place one foot on one end of the teetering with one foot on one end of the mat and the other on the other, stand tall. Slowly and steadily inhale while raising your arms, stretching your waist, and tightly clutching the backs of your upper inner thighs (A). Exhale gently as you pull your head and arms forward, shoulder-width apart, and lower your hands to the mat by rolling your spine (not your hips) and scooping your abs. 3 1/2 large straight-armed steps forward until you're in a rigid plank position from head to heels, shoulders beyond wrists (B0. 3 1/2 giant straight-armed steps forward until you're in a rigid plank position from head to heels, shoulders past wrists. Maintain your equilibrium by balancing on the tips of your toes. He was on the mat, while the other was on the couch. Place one foot on one end of the teetering Place one foot on top of the other and stand tall. Six times, jump your legs open and closed, achieving a solid shoulder-past wrist posture with each repetition. From a plank posture, lift your chest and fold it towards your thighs using your powerhouse muscles. While walking hands back to feet with straight arms, roll up your abs to standing. Repeat the method three times in total.

Corkscrew

Lie down on your back with your arms by your sides. Press the upper inner thighs' backs tightly around each other. Gradually inhale as you lift your knees and roll backward until you're balanced between your shoulder blades and the backs of your arms. Roll back down the spine, bending slightly to the right, pointing your toes, and softly exhaling. Inhale softly as you loop your legs to the left, rolling up the left side of your body while scooping your abs and elevating your bottom. To complete three sets, reverse the circular configuration each time.

Kneeling sidekicks

Kneel with your hands along your waist in the center of the mat. Stretch your right leg out to the side, in line with your hip, while placing your left hand on the mat, palm down. The right hand should be placed behind the head, the hip over the knee, and the shoulder over the wrist. On a fast inhale, swing the right leg back firmly without shifting the hips in front of the knee or disturbing upper body posture. Exhale deeply while kicking your leg forward without forcing your hips back or altering your chest or elbow position. Kick eight times forward and back, then switch sides, swinging back to widen the front body and kicking front all eight times to deepen the scoop.

Rolling like a cannonball

Sit with your knees bent to your chest and your hands securely wrapped around your fronts and ankles on the mat. Draw your abs in and away from your thighs while tucking your head between your knees. Roll onto your upper back (never allowing your body's weight to rest on your cervical vertebrae), then roll back up to balance on your tail—but this time, press your knees and feet tightly together, let go of your hands, and leap into the air. Reverse the motions and return to the mat by landing gently. After rolling back, cannonball four to six times.

Seal

Sit on the mat with your knees bent, toes together, and knees apart so you can see your ankles. One palm on each side, "dive" your hands between your legs and wind them around to the outsides of your ankles. Scoop your core, engage your inner thighs, and fire your biceps as you lift your feet off the mat and balance on your tailbone. Starting with controlled inhalation and a deepening of the abdomen, roll back onto your upper back. With your exhale, roll back up to balance on your tail. Try three simple seals, focusing on the floor and strengthening your abs with each roll. Add two to three "flipper" claps (extending and closing legs from deep powerhouse muscles) and two or three flipper claps on the backs of shoulders as a balance on the tail, never allowing the body's weight to rest on the neck.

The hundred

Sit on the training mat with your body on your backbone, then spread your legs out at a 45-degree angle beside the ground. Bounce your arms and body together, 3 to 4 inches beyond the mat. Arms are driven equally by a high head and shoulders. To complete one recurrence, breathe in for 5 pumps and breathe out for 5 pushes. Twist knees at a 90-degree angle for a simple step; shines are equal to the surface as drive.

Bridging

The subject must remain in the beginning position. Inhale and roll the spine down vertebra by vertebra, starting at the coccyx and ending at the shoulder blades; repeat inhalation and roll down vertebra by vertebra, starting at the coccyx and ending at the shoulder blades.

2.4.2 Protocol for Group B

For 12 weeks, Group B participants followed the protocol and conducted the following exercise routines daily.

STRENGTHENING EXERCISES

Exercises that are meant to enhance the strength of a certain muscle or set of muscles are known as strengthening exercises. Strengthening activities cause the muscle to be overworked until it becomes fatigued. The muscle grows and becomes stronger as a result of the stress and overload.

Squats

Start with bodyweight squats and progress to dumbbells, kettlebells, or a barbell. Start with a loaded barbell; a weight of 65 to 75 pounds is a perfect way to start. Beginners should start with just the barbell and work their way up as their confidence in the technique grows. On the barbell, your hands should be about shoulder-width apart and the bar should be clasped lightly. As you elevate your elbows, rest the bar on your collarbone and shoulders. Elbows should be raised as high as possible depending on your mobility. Lift the barbell off the rack with your feet around hip-distance apart. Back up one or two steps. Return your weight to your heels. As much as possible, brace your abs.

Lunges

Stand tall with your feet together while holding 10-pound dumbbells at the therapist's side. Bend both knees to 90 degrees and step forward with your left side leg, dropping your hips to the floor. The rear knee should be pointed toward but not touching the ground, and the front knee should be directly above the ankle. To move your right leg forward, press your left heel into the ground and push off with your right foot, stepping into a lunge on the opposite side with control.

Split squats

Step backward about three steps with your left foot, holding the dumbbells at your shoulders with palms facing out. Raise the weights to the ceiling. As you lower your weight to your shoulders, bend your knees and make 90-degree angles with both legs. Return the weights to the ceiling by straightening both legs.

Triceps push up

Start with your arms and chest straight and your shoulders over your wrists in a plank position. Maintain focus on the essential. Lower the chest to the floor by bending the elbow behind you. As you return to the plank position, keep your upper arms in place.

Bench press

With a set of dumbbells, sit on a flat workout bench. Lean back on the bench and rest one dumbbell on your thighs with each hand. Maintain a 90-degree angle between your upper arm and forearm by holding the dumbbells shoulder-width apart above your chest. Your hands should be pointing forward with the palms facing front. As you lift the dumbbells to full extension, take a deep breath and exhale. For one second, hold the position. Slowly lower the weights to the sides of your chest while inhaling.

Glute Bridge with chest press

Begin on your back with your knees bent and your feet hip-distance apart. Hold the weights close to your chest. Squeeze glutes while you raise your pelvis to the ceiling, forming a bridge. Keep your ribs in line with your pelvis. Press the weight to the ceiling precisely above the shoulders while holding the bridge. To complete the repetition, lower the weight.

Renegade rows
Begin in a high plank position with each hand gripping a dumbbell on the floor. Spread your feet wider than your shoulders. Pull right elbow back as you raise weights to chest level, maintaining right elbow close to the torso, abs taut, and hips low. Rep the process on the other side.

Dumbbells shoulder press
Standing with your feet shoulder-width apart is a good idea. Raise the dumbbells to shoulder height by picking them up. The palm might face forward. Raise the dumbbells over your head until your arms are completely extended, then rest for a few seconds before lowering them to shoulder height.

Hip extension
Pull the left leg back as far as you can while maintaining it straight and gently return to the starting position with the resistance band looped around both ankles and a straight line through the torso. Make sure you do it on both sides.

Resistance band leg press
Lie down on your back and raise your feet off the ground. Make a 90-degree angle by bending the knee. Wrap the resistance band around the feet and grip the ends while flexing the feet and pointing the toes upward. Return to the beginning position by pressing the feet on the band until the legs are completely stretched.

2.4 STATISTICAL ANALYSIS

Table 1: Included age and BMI

Age	25 to 35
BMI	26 to 35

Table 2: Subjects are divided based on BMI

BMI ratio	No. of Subjects
26 to 28	14
29 to 32	9
32 to 35	7

Table 3: Data Analysation between Group A and Group B

	GROUP A	GROUP B
Mean difference	4.93	4.13
Standard deviation	0.88	1.08
Paired't' test	21.61	14.75
Unpaired't' test	2.21	

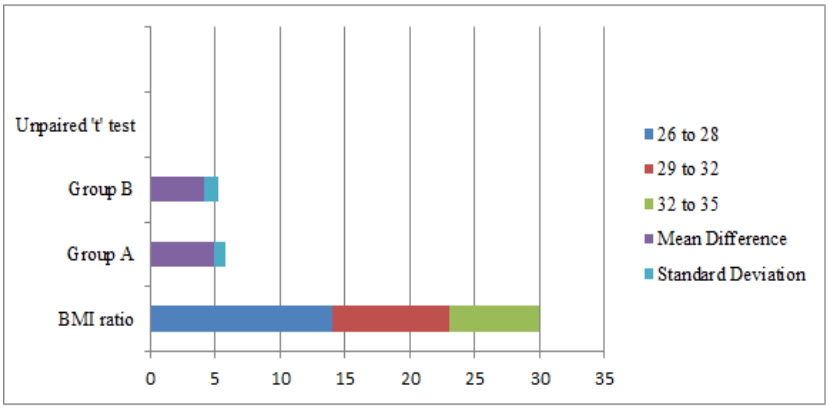

Fig 1: Data Presentation between Group A and Group B

3. RESULTS

Thirty-six subjects were enrolled in both groups A and B. The pre and post-test values of BMI (body mass index) were assessed by obesity weight loss and quality of life in group A. The mean difference value is 4.93. The standard deviation value is0.88. The Paired t value is 21.61. The pre and post-test values of BMI (body mass index) were assessed overweight loss and quality of life in group B. The mean difference value is 4.13. The standard deviation value is1.08. The paired t value is14.75. The calculated Unpaired't' test values for BMI (body mass index) were 2.21. The value suggests that practicing Pilates and strengthening exercises help to reduce weight in postpartum obese women.

4. DISCUSSION

According to Dalrymple KV, Flynn AC (2018), Excessive gestational weight gain (GWG) and Postpartum Weight Retention (PWR) have been linked to the development of obesity in women. The goal of this systematic review was to see how helpful lifestyle treatments are for maintaining postpartum weight in overweight or obese pregnant and/or postpartum women up to two years after giving birth.[20] According to Vancini RL, Rayes ABR, Lira CAB, Sarro KJ (2017) Pilates and walking have been shown to improve quality of life, as well as depression and anxiety. The Pilates approach might be utilized as an option to help overweight and obese women with mood issues.[21] According to Melissa Mazzarino and Meg E. Morris (2016), There is no proof that pilates can help women's health during pregnancy or with illnesses like breast cancer, obesity, or low back discomfort. To assess the effectiveness of pilates for improving women's health outcomes, more high-quality RCTs are needed.[22]According to Willis LH (2012), Resistance training is now part of the exercise prescription for weight reduction and maintenance, according to new recommendations. Few studies, however, have evaluated the effects of equivalent levels of aerobic and resistance exercise on body mass and fat mass in obese people. A randomized experiment called STRIDE ATRT examined aerobic training, strength training, and a combination of the two to find the best form of exercise for weight loss.[23]The experiment took 12 weeks to complete, with a sample size of 36 people in the 25–35 age range. The individuals were chosen at random from 36 BMI (body mass index) postpartum obese women and divided into two groups. Palettes were supplied to Group A, and strengthening exercises were given to Group B. BMI was used to take the measurements (body mass index). Subjects getting Pilates exercise scored much higher than those receiving strengthening training in terms of weight reduction and quality of life. Paired t-test was used to analyze the effect of Pilates on weight loss and quality of life among postpartum obese women. There was a significant and considered very significant difference in weight loss and quality of life and overweight loss and quality of life post 12 weeks of treatment for Group A and Group B. There was also an extremely significant difference in weight loss and quality of life. As a following finding of the, Group A participants treated with Pilates experienced more weight reduction and improved quality of life than Group B subjects.

5. CONCLUSION

Based on the statistical analysis there was a significant difference in the treatment in the Pilates group than the strengthening exercise group. Here, the null hypothesis is not accepted and accepts the alternate hypothesis which states that "there was a significant difference in effects obtained by the treatment techniques between Pilates and strengthening exercises. This study suggests that Pilates exercise is more

effective than strengthening exercise to reduce weight and improve the quality of life in post-partum obese women.

6. CONSENT

Written informed consent was obtained from the patient.

7. ETHICAL APPROVAL

This study was conducted after getting permission from the Institutional Ethical Committee and as well informed consent was obtained from the patients for conducting this study and for the publication of this research work.

8. ACKNOWLEDGEMENT

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9. CONFLICT OF INTEREST

The authors have no conflict of interest.

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SP-5

Comparison of Intercostal Stretch Along With Manual Diaphragm Release Technique Versus Diaphragmatic Breathing Along With Manual Diaphragm Release Technique In Reducing Dyspnea, Improving Chest Expansion And Functional Capacity In Copd Patients

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Abstract: COPD patients' strength in Respiratory muscles and specifically Diaphragm elicit changes in the performance and functional capacity. Even though most of the methods for improving chest expansion and functional capacity are commonly breathing exercises only. It may cause a decreased diaphragm flexibility and increase the risk of decreased volumes and capacities of the lung. The study conducted is designed to focus on the importance to improve chest expansion and functional capacities and also decrease Dyspnea. Specific Stretch and release with breathing exercises. Based on inclusion and exclusion criteria, a total of 30 patients were selected and divided into two groups using convenient sampling. Group A (n=15) received a set of Intercostal Stretch with the Manual Diaphragm release technique and Group B (n=15) received Diaphragmatic breathing with the Manual Diaphragm release technique for eight weeks. Based on FEV1, FVC and Dyspnea significantly Group A mean values are 1.12, 1.25, and 3.0 respectively and the standard deviation is 0.173, 0.145, and 0.85, and paired 't' values are 18.5, 3.31, and 13.41 demonstrated significant improvements in the chest expansion and functional capacities and also decrease the Dyspnea. Respectably indicated that Group B mean values are 0.19, 058, and 1.3 respectively and the standard deviation is 0.109, 0.089, and 0.57, and paired 't' values are 6.7, 2.48, and 6.2. The study's findings indicate that both groups have improved, however, Intercostal Stretch with the Manual Diaphragm release technique is beneficial for improving the chest expansion and functional capacities and also decreasing the Dyspnea for COPD Patients.

Keywords: COPD Patients, Intercostal Stretch, Diaphragmatic Breathing, Manual Diaphragm Release Technique, FEV1, FVC, Dyspnea, Chest Expansion.

1. INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a lung ailment in which airflow is restricted. Over time, the condition progresses and worsens. COPD is not reversible; however, development can be slowed with treatment. Although patients can breathe normally while inhaling, alterations in the small airways lead the walls of the airways to narrow during expiration, making it difficult to exhale. The small sacs where oxygen and carbon dioxide are exchanged are damaged in many COPD patients, depriving the body of oxygen. COPD is the recommended term for patients with chronic bronchitis, emphysema, bronchiectasis, and bronchial asthma, who have airflow obstruction. Emphysema and chronic bronchitis are both caused by smoking; both illnesses commonly arise concurrently and require comparable treatments and methods. In affluent countries, one of the primary fatalities is chronic obstructive lung disease (COLD). For a long time, the forced expiratory volume in the first second (FEV1) has been considered the most important predictor of COPD mortality with age, and COPD severity is usually determined by the degree of airway blockage as measured by FEV1.[1-4] The intercostal muscles are numerous and extend out over the rib cage. During respiration, it aids in the upward and outward movement of the ribs (Hirai et al 1996). Intercostal stretching

helps to regain normal breathing patterns while also enhancing chest wall mobility and hence chest expansion. (Vikram Mohan et al 2012). In patients with chronic obstructive lung disease, diaphragmatic breathing is commonly employed in pulmonary rehabilitation. According to research published in BMC pulmonary medicine in 2014, diaphragmatic breathing can promote quality of life and lessen COPD symptoms including breathlessness. The Manual Diaphragm Release Technique is a technique for stretching the diaphragmatic muscle fibres directly. Even though this procedure is commonly utilized in medical practice in various areas, it is claimed that no surveys or human studies have been conducted too far to evaluate its effectiveness. The goal of this research conducted is to examine the impact of the Manual Diaphragm Release Technique on COPD patients' pulmonary function. Increasing the mobility of the thoracic structures involved in respiratory mechanics is a common goal.[5-9]

2. MATERIALS AND METHODS

2.1 Participants

The study included 30 patients, 15 patients out of 30 were put in A and 15 patients out of 30were put in GROUP B. All of the participants went through a Cardio-Respiratory Assessment Performa the median time delay was 3 weeks which included the period between, before and the after session. Intercostal Stretch Technique with Manual Diaphragm Release Technique was used on 15 patients, while Diaphragmatic Breathing Technique with Manual Diaphragm Release Technique was used on 15 others.

2.2 Study Design

This research was designed as a case study. The treatment regimen was delegated to the two physiotherapists. The individuals were evaluated by the first physiotherapist both throughout and after the treatment program. The treatment program was administered to the subjects by the second physiotherapist.

2.3 Outcome Measures

2.3.1 Dyspnea Grading (New York heart association classification of DYSPNEA)

2.3.2

Table 1: Dyspnea Grading

Grade 1	No dyspnea
Grade 2	DYSPNEA on moderate exertion
Grade 3	DYSPNEA on mild exertion
Grade 4	DYSPNEA at rest

2.3.2 Spirometer

To estimate lung function, the NHANES spirometry protocol depends on certain standard spirometry measurements were used. The spirometry test is carried out by the patient using a spirometer, which is a device that measures the amount of air exhaled by the subject as well as the rate at which the air is exhaled. The patient must exhale as strongly as possible after taking a full, deep breath in the basic standard spirometry test. The forced expiratory maneuver is the name given to the patient's attempt. Forced vital capacity (FVC): The maximal amount of air expelled forcibly following a maximal inspiration is known as forced vital capacity (FVC). The forceful exhalation should last at least 6 seconds, but it may take much longer for people with COPD to exhale all of the air. Forced expiratory volume in one second (FEV1): The volume of air expelled during the first second of a forced expiratory maneuver is known as the forced expiratory volume in one second (FEV1). In the first second of a forced expiration maneuver, a healthy person can expect to expel 70 to 80 percent of their FVC. The normal FEV1/FVC ratio is between 70 and 80 percent.

2.4 Intervention

The treatment program was carried out for 6 weeks for each subject. Among 30 subjects, 15 were treated with the Intercostal stretch technique with the manual diaphragm release technique, and 15 were given the Diaphragmatic breathing technique with Manual Diaphragm Release Technique. Pre-test assessments were conducted on both Group A and Group B respondents.

2.5 Training Program

A random sample approach was used to choose 30 patients who fit the inclusion and exclusion criteria, 15 of whom were assigned to Group A and 15 to Group B. Subjects were given a thorough explanation of the study, and those who met the requirements signed a written informed consent form. Following the completion of the informative material, they were instructed on how to use the scale. The subjects were given clear instructions, including the purpose, safety procedures, safeguards, and psychological support. Every critical indicator was examined. Pre-test assessments were conducted on both Group A and Group B respondents.

2.5.1 Group A: Intercostal Stretch Along with Manual Diaphragm Release

***Position of the patient**: Supine lying*
Procedure:

The therapist is positioned behind the patient. Palpate the suprasternal notch first, then move down about 5 cm and palpate the Louis angle. The second rib is located at the level of Louis' angle. The intercostal stretch technique is used bilaterally on the 2nd and 3rd ribs. The procedure is performed with the index finger. The pressure is directed downward, towards the next rib. During the expiratory phase, the technique is used. It is performed three times for three breaths with a one-minute pause in between. This method will be used twice every day.

2.5.2 Group B: Diaphragmatic Breathing Along with Manual Diaphragm Release Technique

***Position of the patient**: supine lying*
Procedure:

Prepare the patient in a relaxed position. The therapist must place their hands on the rectus abdomen of the patient underneath the anterior costa border. Ask the patient to take slow, deep breaths via the nose while maintaining the shoulder relaxed and the upper chest quiet, allowing the abdominal to expand. Next, ask the patient to slowly exhale all of the air through the mouth using controlled expiration. If the patient feels any discomfort ask him to keep the hand on his abdomen and let him breathe to feel the contraction of abdominal muscles.

2.5.3 Manual Diaphragm Release Technique

Position of the patient: supine lying
Procedure:

Manual contact with the bottom of the costal cartilages of the seventh to tenth ribs was made by the therapist (pisiform, hypothenar area, and the last three fingers). The therapist gently tugged in a cephalic manner during the participant's inhalation, in sync with the upward movement of the ribs. The therapist kept resistance by deepening contact with the inner coastal margin during exhalation. On each subsequent breath, the therapist sought to establish traction and eventually intensify the contact. The workout consisted of 2 sets of 10 deep breaths, each followed by each break.[19]

2.6STATISTICAL ANALYSIS

Table 1: Mean Difference and Standard Deviations of Group A and Group B for FEV_1, FVC, and Dyspnea Grading

	MEAN DIFFERENCE			STANDARD DEVIATION		
GROUPS	FEV1	FVC	DYSPNEA GRADING	FEV1	FVC	DYSPNEA GRADING
GROUP A	1.12	1.25	3.0	0.17	0.145	0.85
GROUP B	0.12	0.58	1.3	0.11	0.089	0.57

Table 2: Comparison of the Paired 't' test, Unpaired 't' test, And Table Value Between Group A and Group B

CALCULATED PAIRED ' t' VALUE					
GROUPS	FEV1	FVC	DYSPNEA GRADING	TABLE VALUE	SIGNIFICANCE
GROUP A	18.5	3.31	13.4	2.15	SIGNIFICANT
GROUP B	6.6	2.48	6.7	2.15	SIGNIFICANT
CALCULATED UNPAIRED ' t' VALUE					
Between the Groups	14.78	14.89	7.63	2.05	SIGNIFICANT

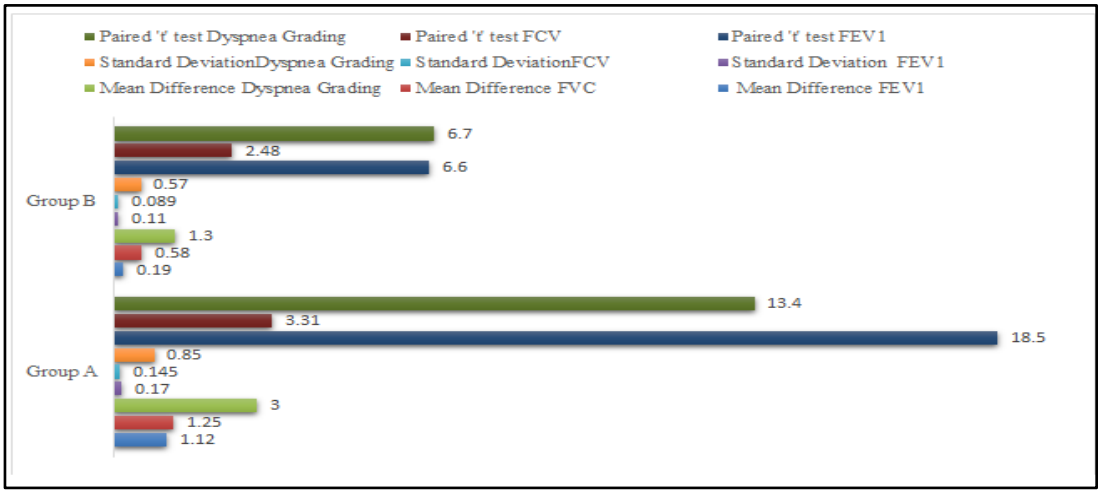

Fig 1: Mean Difference, Standard Deviations, and the Paired't' Test of Group A and Group B for FEV_1, FVC, and Dyspnea Grading

3. RESULTS

The study included 30 patients, 15 of whom were from GROUP A and 15 from GROUP B. All of the participants went through a Cardio-Respiratory Assessment Performa. Between before and after therapy, the median time delay was 3 weeks. Intercostal Stretch Technique with Manual Diaphragm Release Technique was used on 15 patients, while Diaphragmatic Breathing Technique with Manual Diaphragm Release Technique was used on 15 others. For Group A pre and post-test values were assessed by the functional capacity of FEV1, FVC, and New York Heart Association Classification of DYSPNEA scale. The mean difference values are 1.12, 1.25, and 3.0. The standard deviation values are 0.17, 0.145, and 0.85. The paired 't' test values are 18.50, 3.31, and 13.41. For a 5% level of significance at 14 degrees of freedom, the paired 't' test value is greater than the table value 2.04. For Group B pre and post-test values were assessed by the functional capacity of FEV1, FVC, and New York Heart Association Classification of DYSPNEA scale. The mean difference values are 0.19, 0.58, and 1.3. The standard deviation values are 0.11, 0.089, and 0.57. The paired 't' test values are 6.62, 2.48, and 6.7. For a 5% level of significance at 14 degrees of freedom, the paired 't' test value is greater than the table value 2.04. FEV1, FVC, and the New York Heart Association Classification of DYSPNEA scale showed calculated 't' values of 14.78, 14.89, and 7.63, respectively, using an unpaired 't' test. For a 5% level of significance at 28 percent of freedom, the calculated 't' values were greater than the table value 2.05.

4. DISCUSSION

According to Nutsupa ubolnuar (2019), Based on low to regulate quality evidence, the report found that PLB, VF plus exercise, DBE, and combination BE's are conditionally indicated to enhance airflow in COPD patients. In COPD patients, singing exercise improves physical components as well.[10] According to Camilo corbellini et al (2018), Diaphragmatic mobility loss in people with moderate to severe COPD may recover during in-patient pulmonary rehabilitation conclude that at discharge inspiratory capacity improved and diaphragmatic mobility during deep inspiration increased after pulmonary rehabilitation. These alterations were linked to the severity of COPD, and diaphragmatic mobility was enhanced during inpatient pulmonary rehabilitation.[11]According to Karina M. Cancelliero-gaiad et al (2018), Diaphragmatic breathing increased lung

capacity, respiratory motion, and spo2, while also lowering respiratory rate. Despite the fact that COPD patients had no differences in volume or duration during Pilate breathing, these breathing patterns enhanced volume and oxygenation in both healthy and COPD patients. In this context, the transient benefits of diaphragmatic breathing as a helping treatment in respiratory rehabilitation programs are underlied.[12]According to Marie Carmen Valenza et al (2015), This is concluded that, In the first second, diaphragm stretching can enhance maximal respiratory pressures, force vital capacity, and forced expiratory volume.[13]According to Taciano Rocha et al (2015), The Manual Diaphragm Release Technique, enhances diaphragmatic mobility, exercise ability, and inspiratory capacity in individuals with chronic obstructive pulmonary disease. This treatment may help people with chronic obstructive lung disease (COLD).[14] According to Aliverti et al (2009), the Lower ribcage paradox occurs frequently at relaxation and is associated with initial chest wall expansion and prominent DYSPNEA near the end ofthe activity. When a person loses their awareness of leg effort, it becomes a more serious condition that prevents them from exercising.[15]According to Andrea Aliverti et al (2004), Gender differences in operational lung volumes in relation to increasing exercise are mostly due to lung size differences, although compartmental chest wall kinematics do not differ across sexes.[16]According to Feland et al 2001, The study concluded that PNF stretching helps players improve range of motion, muscle strength, power, and athletic performance.[17] According to M vitacca et al 1998, The study stated that deep diaphragmatic breathing for patient with severe COPD with Chronic hypercapnia is linked to improved blood gas levels at the cost of increased inspiratory muscle loading.[18] While consideration of improving functional capacity FEV1/FVC ratio and reducing DYSPNEA in COPD patients, I discovered that there was a significant improvement in COPD patients.The immediate effects of intercostal stretch with the Manual diaphragm release technique show significant improvement between pre and post-test values of New York heart association classification of DYSPNEA and FEV1/FVC ratio. Comparing the New York heart association classification of DYSPNEA scale and FEV1/FVC ratio values within the groups showed a statistically difference in DYSPNEA scale and FEV1/FVC ratio. This can be probably because of the smaller sample size and immediate measurement of the values. The New York heart association classification of DYSPNEA scale and FEV1/FVC ratio values may probably showa significant difference when measured after long-term treatment and follow-up.

5. CONCLUSION

As a result of the findings of this research, intercostal stretch with Manual diaphragmatic release technique and diaphragmatic breathing with manual diaphragm release technique shows improvement in functional capacity and reduction in DYSPNEA in people with COPD. Clinically, it is necessary to regain adequate functional capacities after COPD. It can be seen that there is a significant difference between the calculated and table values based on paired 't' values in both groups. The mean and standard deviation between these groups showed greater from intercostal stretching with Manual diaphragm release technique than diaphragmatic breathing with Manual diaphragm release technique. But based on the unpaired 't' value there is a significant difference between intercostal stretching with the Manual diaphragm release technique than diaphragmatic breathing with the Manual diaphragm release technique. The study's findings suggest that intercostal stretching combined with manual diaphragm release method and diaphragmatic breathing combined with manual diaphragm release technique are significantly different in terms of effectiveness.

6. CONSENT

Written informed consent was obtained from the patient.

7. ETHICAL APPROVAL

This study was conducted in accordance with ethical procedures and policies as per "ICH Guideline for Good Clinical Practice- E6(R2)" and approved by the Institutional ethical committee (IEC) of Nandha College of Physiotherapy. Subjects were selected from our own outpatient department of Nandha College of Physiotherapy and Nandha Medical College and Hospital, Erode, Tamilnadu. After completion of the study, the publication of results data could be stored in our college data repository.

8. ACKNOWLEDGEMENT

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9. CONFLICT OF INTEREST

The authors have no conflict of interest.

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SP-6

Effect of 12 Weeks Crossfit Exercise Program For Second Cesarean And Contraception Women Regaining Pre-Pregnancy Shape.

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Abstract: The study was designed to explain the Cross-Fit exercise for regaining pre-pregnancy shape for C-section and family planning women with dietary control for lactation. The study was done on 20 subjects with C-section and family planning women as a single group. For 12 weeks, this group would do lactation exercises with dietary control. Subjects were chosen using an efficient sampling procedure, and the study was fully outlined to them, with consent form were filled and procedure was explained to the subjects. Also, cardio workouts followed by CrossFit exercises along with warm-ups and cool- down were performed within 30 minutes. The paired t-test values show that exercise was more effective than normal routine follow-up in C-section and family planning women. The previous and later study was evaluated through inch tape for muscle circumference in the experimental group. The mean difference value for waist was 5.10, Thigh -4.75, and BMI-3.45. The standard deviation value for the waist is -0.45, Thigh -0.64, BMI-0.68. The paired "t" test value for waist-51.00, Thigh-32.26, and BMI-22.57. The before and after BMI values have been evaluated by BMI Formula in pre-test is 546.9 and the post-test is 478. The results of the paired t-test showed that CrossFit exercise combined with diet control was beneficial for weight loss. Obesity t-test values have shown that subjects with C-section and family planning females with nutritional control for breastfeeding have substantial gains in their standard of living. Hence, the study shows more improvement in bringing pre-pregnancy shape back and increasing confidence in women after pregnancy. The present study suggests that exercise receiving persons have reduced muscle circumference and also exercise receiving their pre-pregnancy shape.

Keywords: Cross-Fit Exercise, Muscle Circumference, BMI, Family Planning, Postnatal Women, C-Section

1. INTRODUCTION

The postpartum period is defined as the period that starts immediately after one child's birth and seems to last for about 6 to 16 weeks. The postpartum period is classified by the World Health Organization (WHO) as the most pivotal until now unappreciated timespan in the existences of women and new-borns. During pregnancy, the changes in hormones can cause the ligaments and joints to be more flexible and mobile. The tendons and ligaments can become loose and potentially can take months to recover (they take even longer to return to normal if breastfeed). Increased risk of atherosclerotic disease is associated with waist circumference, hip circumference, and thigh circumference measured using the circumference of waist-hip, and thigh.[1] CrossFit exercise is a sign of increased circuit training that consists of muscle activation at a greater luminance. Regular exercise postpartum will not only increase the fitness levels, but it will also help the body to stimulate recovery from the labour of attending c section, improve the energy levels and help to feel less lethargic, aid in weight loss, and improve the mood if it needs it(Exercise is great for relieving stress, will help to switch off and focus on a bit and will get out talking to people and getting some fresh air.[2] A caesarean section is a type of foetal delivery that involves an open surgical cut (laparotomy) and a uterine

incision (hysterotomy). The very first recorded caesarean section took place in 1020 AD, and the methodology has vastly improved since then. It is now the most common treatment in the United States, with over 1 million women giving birth by caesarean section each year. Caesarean births rose from 5% in 1970 to 31.9 percent in 2016. Despite ongoing efforts to reduce the rate of c sections, specialists do not expect a large reduction for at least another decade or two. Surgical intervention can be a completely safe way for some women to produce a better and healthy infant, knowing the risks of both instant and lengthy problems.[3-5] In terms of effectiveness, family-planning procedures are generally categorized into three parts: most appropriate, efficient, and so much less effective. Woman sterilization is a surgical procedure that is performed as an outpatient procedure. The methodology inhibits eggs from having to travel downhill fast to the uterine and ovum from fertilizing the egg by obstructing the fallopian tubes. According to the Disease Control and Prevention (CDC), one out of every five women between the ages of 15 and 44 who used a method of contraception had surgical abortions. Women in the early stage of marriage, aged between 35 and 44 as well as womens who've had 3 or even more children have the greatest percentage of being sterilized.Similarly, sterilization rates are higher among black and Hispanic women with a c section. Daily 16-hour fasts or fasting for 24 hours multiple times a week are two common intermittent fasting techniques. Skipping breakfast is more natural than eating 3–4 (or more) lunches and dinners per day regularly. Things do happen throughout your body on a cellular and molecular level when you fast. Intermittent fasting's health benefits are attributed to hormone levels, cell function, and expression levels.[6-8]Hence, this study was conducted for women undergoing caesarean after first time labour and women with family planning done to bring back or regain the pre-pregnancy shape through CrossFit Exercises.Health benefits: Weight loss, Insulin Resistance, Inflammation, Heart health Anti-aging.

2. MATERIALS AND METHODOLOGY

2.1 Participants

There are 20 Subjects selected for the study with the age group of 21-30 years with caesarean and family planning. All patients were selected by a simple random method of sampling. Women specifically with second timelabour and BMI ranging 25-29.9. Therapeutic exercises were performed for 1.5 hours with 20 minutes of warm-up and 15 min of warm-down for one session. 3 sessions per week for 3 months.

2.2 Study Design

This study was planned as a case series. The two physiotherapists were held in charge of the exercise protocol. The first physiotherapist evaluated the subjects at the time of treatment and immediately after the exercise program. The second physiotherapist applied the exercise program to the subjects.

2.3 Outcome measures

2.3.1 Body Mass Index

Body Mass Index (BMI) is used to determine overweight and obesity. It is calculated by dividing weight in kilograms by the square of height in meters. Overweight is defined as a BMI of 25.0 or greater and obesity is defined as a BMI of 30.0 or greater.

2.3.2 Weight Scale

The force exerted on the object is measured by the weighing operation, which is the weight of the object.

2.3.2 *Tape Measure*

A tape measure, also known as a measuring tape, is a flexible ruler that is used to determine the size of something. The circumference of the thigh and waist muscles is measured with a tape measure.

2.4 Intervention

The training program was carried out for 12 weeks for each subject. CrossFit exercises were done for post-pregnant women of which included warming up and cooling down for 30 mins for 3 sessions per week. These trainings are conducted to bring Pre-pregnancy shape back and increase the confidence of women after pregnancy.

2.5 Training Program

Subjects were selected by convenient sample method and were clearly explained about the study and written informed consent was obtained from the subjects who fulfilled the criteria. Proper instructions such as purpose, safety measures, comfort, precautions, and psychological support were given to the subjects. For

the following 12 weeks, CrossFit exercises were done for post-pregnant women of which included warming up and cooling down for 30 mins. Also, cardio workouts followed by CrossFit exercises were performed. Belly breathing: Subject was asked to lie down on their back on a soft bed or couch. Place their palms on their belly button and relax their entire body. Were asked to inhale deeply through their nose and feel their stomach expand into their hands. Exhale slowly and deeply through their mouth. Pull their belly button in towards your spine as they exhale, contracting their abdominal muscles. Holding for 3 seconds, then repeat 5 to 10 times more. Wall push-ups: Stand at least 12 inches away from a wall, with their arms extended against it. Place their outstretched hands against the wall and take a shoulder-width stance. Brace their core and tilt their pelvis backward. Begin by bending their elbows while keeping them tucked in close to their body. When their forehead is close to the wall, take a breath and then press back out. Per set, aim for 12 repetitions. Sit against the wall. Wall Sit: The subject was then asked to place their back against a wall and your feet 8 to 12 inches away from it. Maintain a foot width that is slightly wider than their shoulder width. Next, they were asked to flatten their low back against the wall to posteriorly tilt their pelvis. Squat as low as they can comfortably go. Maintain a flat posture with both feet on the ground and their upper back against the wall. Keeptheir hands in this position for 15 seconds. Trunk Rotation. Begin by lying on their back, knees bent and feet flat on the floor. Bring their knees to one side with their hands together. Hold for 3 to 5 seconds. Hold for 3-5 seconds while contracting their abdominal muscles and moving their legs to the opposite side. On each side, repeat 5-10 times. Modified Side Plank:Here, the subject was asked to lie on one side with their knees bent at 90 degrees on the floor. Hold their hips up with their elbow while balancing on their stacked knees. Throughout the exercise, keep your abs tight. As you hold this position, your body should form a straight line from your knees to your shoulder. posterior Pelvic Tilt. Lie down on your back, knees bent, feet flat on the floor. Contract your ab muscles and tilt your tailbone up toward the sky to flatten out your low back against the ground. Their pelvis will naturally rotate into a neutral position as a result of this. Hold this position for 5 seconds without allowing your low back to leave the ground. Per set, aim for 5 repetitions. Chair Dips: A steady chair or bench was taken that can support their weight. As shown in the image above, grab the chair's edge with their palms down and elbows straight. Throughout the movement, make sure to keep your scapula retracted and your hands outward. Asked to avoid putting their hands forward because this puts your shoulder in jeopardy. Bend their elbows and dip down. Asked to straighten their elbows to return to the starting position. Perform ten to twelve repetitions per set. Straight Leg Raise Leg raises completely isolate the rectus abdominal muscles, which aids in stomach toning. Place their palms below their hips and lie down on your back. After that, slowly raise their legs to a 45-degree angle. Keep their knees straight and their feet pointed up at the ceiling. Relax after 10-15 seconds of holding.

2.6 STATISTICAL ANALYSIS

The study consisted of 20 subjects, where the subjects were selected with a random sampling method and according to the inclusive criteria. Before and after the therapy, the median time interval between muscle circumference and BMI level was 12 weeks. These people were then put through CrossFit workouts while being kept on a strict diet. The pre and post-test values were evaluated by inch tape for muscle circumference in the experimental group. The paired t-test values showed that CrossFit exercise combined with diet control was effective for obese subjects. The "t" test values showed that there was a significant improvement in the quality of life in obese women. The BMI formula was used to compare the pre and post BMI values.

2.6.1 Data Presentation

Table 1: Mean Difference and Standard Deviation Between Waist, Thigh Circumference and BMI

TEST	MEAN DIFFERENCE			STANDARD DEVIATION		
	WAIST	THIGH	BMI	WAIST	THIGH	BMI
Experimental Group	5.10	4.75	3.45	0.45	0.64	0.68

Table 2: Paired't' test between Waist, Thigh Circumference, and BMI

PARAMETERS	PAIRED 't' TEST	TABLE VALUE	SIGNIFICANCE
WAIST	51	2.15	SIGNIFICANT
THIGH	33.26	2.15	SIGNIFICANT
BMI	22.57	2.15	SIGNIFICANT

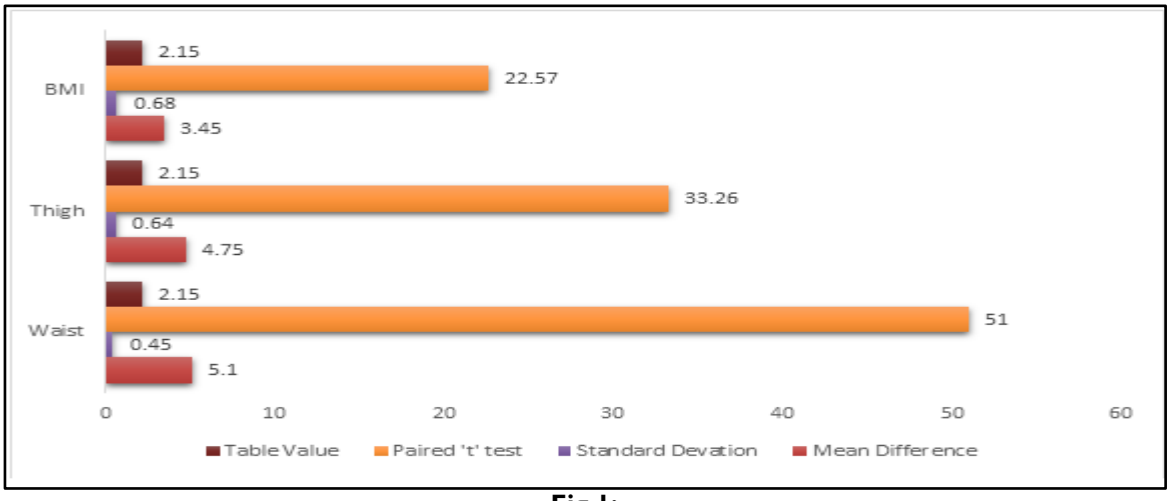

Fig 1:
Statistical Data Presentation for Mean Difference and Standard Deviation and Paired't' test between Waist, Thigh Circumference, and BMI

3. RESULT

The study sample comprised 20 subjects. The mean age of subjects was 21-30 years. The CrossFit exercises with diet were positive in 20 Subjects. Before and after therapy, the percentile latency among muscle circumference and BMI status was 12 weeks. Then 20 Subjects were treated with CrossFit exercises with diet control. In the intervention group, the pre-and post-test values for muscle circumference were measured with an inch tape. The mean difference value for waist - 5.10, Thigh - 4.75, BMI - 3.45. The standard Deviation value for waist - 0.45, Thigh - 0.64, BMI - 0.68. The paired "t" test value for waist -51.00, Thigh - 32.26, BMI - 22.57. The previous and post-BMI values were determined using the BMI Formula, with the pre-test value being 546.9 and the post-test value being 478. The results of the paired "t" test showed that CrossFit exercise combined with diet control was effective for obese people. Subjects with obesity performed significantly better in their standard of living when their "t" test values were used.

4. DISCUSSION

According to K. Maier, J. Wacker, and G. Baster et al 1992. Cesarean section patients in Burkina Faso showed a great interest in family planning. This is independent of medical recommendations. The importance of post-operative contraception is pointed out by the case of a patient dying from silent uterine rupture during the 7th month of her next pregnancy which was conceived only 3 months after the operation.[15]Holiday A Durham, Miriam C Morey, Chery A Lovelady, Rebecca J Namenek Brouwer, Katrina M Krause, and others (2011) The majority of these overweight and obese postpartum women's time was spent sedentary/light activity, and many did not meet the minimum PA guidelines. The focus of postpartum PA promotion should be on reduced sedentary behavior and increased moderate PA.[16] According to Bertz et al., their 12-week behavior modification intervention, which included two independent pieces of training with a nutritionist and physical therapist, weight self-monitoring scales, and bi-weekly text messages, was efficient in reaching substantial weight loss after the intervention and was enduring for one year. Both the diet and diet and exercise interventions resulted in significant weight loss when compared to the control group. After 12 weeks, the diet intervention resulted in a weight loss of -8.3 +/-4.2kg, while the diet and exercise intervention resulted in a weight loss of -6.9 +/- 3.0kg. Furthermore, after a year, the diet initiative tends to result in a weight reduction of 10.2 +/-5.7kg, compared to 7.3 +/-6.3kg for the diet and fitness intervention (p0.001).[17]According to Colleran et al. also found by implementing a 16-week intervention that included weekly individual sessions with a dietitian about calorie restriction, two additional home visits about

exercise, weekly food diary completion, and email support, significant weight loss was achieved. Compared to the control group, the intervention group lost more weight (-5.8kg +/-3.5kg vs.-1.6kg +/-5.4kg). The impact of diet and physical activity interventions on PPWR has been studied using a variety of methods, as can be seen. The impact of successful lifestyle interventions on postpartum weight change is highlighted in van der Pligt et al.'s review. This review, however, did not look into the various intervention strategies used. The best setting, delivery method, diet strategy, contact frequency, and intervention length to limit PPWR remain unknown.[18] According to Daiane Sofia Morais Paulino, Maira Pinho-Pompeu, and other researchers in the year 2020. In women who are overweight or obese, stress is the most common cause of excessive GWG. GWG levels were also linked to insufficient vegetable and bean consumption.[19] Being physically active improves the overall health of an individual decreases BMI, boosts the self-confidence of an individual. In this study, the exercise program has resulted in a significant decrease in muscle girth measurement and improved flexibility. While considering subjects with overweight with second delivery |C-section and family planning, it was found that CrossFit along with Dietary control for lactation in women was effective in improving the flexibility, reduction in muscle circumference, and regaining pre-pregnancy shape.

5. CONCLUSION

Maternal overweight and obesity is the most common high-risk obstetric condition, which has been linked to gestational diabetes mellitus, hypertensive disorders, and new-born macrosomia, among other perinatal complications. Women who are already obese or overweight before a first pregnancy tend to keep or consume more calories after pregnancy than women of average weight, despite larger new-borns and greater variability in gestational weight gain. Weight gain before, during, and after a pregnant woman not only affects the current pregnancy but may also encourage the development of obesity in older women. Hence, the result of the study concluded that CrossFit exercise with diet control is better in reducing the muscle circumference, flexibility, endurance, BMI level, and regaining pre-pregnancy shape in overweight women with C- section and family planning.

6. CONSENT

Written informed consent was obtained from the parents of the students.

7. ETHICAL APPROVAL

This study was conducted after getting permission from the Institutional Ethical Committee and as well informed consent was obtained from the patients for conducting this study and for the publication of this research work.

8. ACKNOWLEDGEMENT

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9. CONFLICT OF INTEREST

The authors have no conflict of interest.

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SP-7

The Effects Of Respiratory Muscle Strength Training And Vocal Function Exercises On The Lung Function Of Classical Female Singers

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Abstract: This experiment looked at the impact of ventilatory resistance training and vocal performance exercises on the pulmonary function of classical female singers. In this study, we focus on the importance to improve the lung function of classical female singers with the help of respiratory muscle strength training and vocal function exercise. Spiro metric standards used to define normal lung function should ideally come from a large random sample of the relevant population and be based on measuring techniques that follow criteria established by organizations like the American Thoracic Society (ATS).Singers and wind instrumentalists are trained with ventilatory muscle training, superior pulmonary function.A total of fifteen classical female singers were taken based on inclusion and exclusion criteria by a convenient sampling method. The subject received respiratory muscle strength training and vocal function exercise for twelve weeks. Based on vital capacity, FEV1, song singing scale from wise and Sloboda, the mean values are 0.6, 0.46, 3.33 respectively and standard deviations are 0.616, 0.068, 0.72 respectively and paired't' test values for VC, FEV1, song singing scale from wise and Sloboda are 25.224, 26.179, 17.84. Statistical analysis (paired t-test) revealed a significant increase in vital capacity, FEV1, song singing scale from wise and Sloboda after the treatment period in the intervention group. This study was designed to increase the vocal ability and hence the subjects were demonstrated to enhance their lung function with respiratory muscle strength training and vocal function exercises. So, it was concluded that respiratory muscle strength training and vocal function exercises gives more effect on the lung function of classical female singers.

Keywords: Respiratory Muscle Strength, Lung Function, Vocal Exercises, Vital Capacity, FEV1.

1. INTRODUCTION

Voice amplitude is one of the essential components of speech, singing and it is used for several functions. Amplitude reduction is used to diagnose and reduce abnormal voice problems. People with Parkinson's disease have trouble communicating because their intensity is too minimal and monotonous.[1] Laryngeal or Systemic disease, trauma, improper treatment can lead to voice problems. Professional voice users also include attorneys, clergy, educators, politicians. The Human voice is extraordinary. It can communicate the terror of a scream and the beauty of a song. Hypochondriasis is a rare condition in series singers and other professional singers. Initially, voice complaints may seem vague and subjective for health care professionals unfamiliar with singers and actors. There is an accepted definition for breathing by vocal researchers, fluid flow in respiratory airways. "Air must be transported through various constrictions along respiratory tract to generate sound." "Transport properties of air through tube and ducts of breathing spaces" is thus must be studied.[2]For good controlled breathing, professional singers emphasize the significance of muscle support, particularly for the core or diaphragmatic regions. The usage of the diaphragm to provide support changes between vocalists. When vocalists sing, their audio emission and breathing pattern are measured.[3] Paradoxical vocal fold motion (PVFM) is a laryngeal disorder. In PVFM, vocal folds adduct during inhalation and exhalation. This restricts the airway. PVFM symptoms appear suddenly and last for a few minutes after increasing physical activity. The patients frequently complain of tightness localized to the larynx area and also

report dyspnoea.[4] Because laryngeal dynamics, breathing control, and registers are based mostly on personal belief than on experimental proof, vocal instruction is important. Singing has progressed to a great level of sophistication and finesse. Variable basic frequencies and audio concentrations influenced transgalactic outflow and subglottic barometric pressure, according to the research.[5] Training improved the cardiopulmonary endurance of patients with significant chronic ventilation restrictions. The distance traveled in 12 minutes, peak oxygen consumption on a progressing multistage fitness test, and endurance duration at the maximal output were used to measure physical performance.[6] The respiratory system provides the foundation for pronation. laryngeal valuing degrees vary according to voice usage patients, cultural backgrounds. Any imbalance in the respiratory, laryngeal system may manifest in technical compensation. The baseline value is identified to differentiate technique-related dysfunction within the phonatory subsystem.[7] Voice therapy techniques have long viable adjuncts to pharma therapy for voice production management. General orientation includes symptomatic, etiologic, psychogenic voice therapy. The goals include modification and improvement of larynx muscle strength, balance, tone, stamina, improvement in respiratory effort and control, laryngeal tone, and healthy vocal fold cover.[8]Singing and playing stringed instruments are appropriate for training in voluntary breath control. Then, the respiratory function with chronic obstructive pulmonary disease, emphasizesthe effects of ventilatory muscular training on exercise tolerance and respiratory volumes. Singers and wind instrumentalists are trained with ventilatory muscle training, superior pulmonary function[9]. The constant use of diaphragm & skeletal muscle with expiration leads to hypertrophy. This alters the volumes of the various divisions of lung air. Trained professional singers have to measure the lung volumes & capacities.[10]To evaluate patients with respiratory disease, Spirometry is used. Spiro metric standards used to define normal lung function should ideally come from a large random sample of the relevant population and be based on measuring techniques that follow criteria established by organizations like the American Thoracic Society (ATS).[11-12]. Hence this study is to determine the extent of respiratory muscle strength training and the vocal function exercise technique. Majorly, analyze the effects of respiratory muscle strength training and vocal function exercise on lung function of classical female singers.

2. MATERIALS AND METHODS

2.1 Participation

A total of 21 classical female singers were included in this study and these six subjects were excluded due to exclusion criteria. With an age group of 25-30 years. Inclusion criteria were as follows: More than 3 years to 14 years of trained classical female singers, Muscle weakness, loss of coordination, muscle tension dysphonia, neurolaryngeal dystonia, and vocal tract activity that is ambiguous.

2.2 Study Design

This study was planned as a quasi-experimental study design. The subject in this study will receive respiratory muscle strength training and vocal function exercises on lung function.

2.3 Outcome Measures

2.3.1 Vital capacity

The largest volume of air that may be ejected forcefully following a deep or maximal inhale is known as vital capacity (VC).

2.3.2 Forced expiratory volume in one second.

Forced expiratory volume in first second (FEV1), after a deep inspiration, is the volume of air that may be forcedly expired in a particular unit of time (one second).

2.3.3 Pulmonary function test.

Pulmonary function tests are important in determining the ventilatory system's functioning state. The volume of gas breathed in and out in silent and forceful ventilation is measured in lung function tests. Spirometers are used to perform the majority of these examinations.

2.3.4 Song singing scale from wise and Sloboda questionnaire method.

A questionnaire comprising information about the vocal history, current voice training, voice usage, and details about regular singing practices. The questionnaire contained a series of voice-use questions in addition to the EASE.

2.4 Intervention.

A performance enhancement program was carried out for 12 weeks for each classical female singer. Respiratory muscle strength training and vocal function exercises were performed a maximum of one hour per session, twice a day, and six sessions a week for 12 weeks.

2.5 Training Program.

The subjects were chosen using a practical sampling strategy. A suitable sampling procedure was used to pick 21 respondents who fit the inclusion and exclusion criteria; 15 subjects were included and 6 subjects were eliminated due to inability to complete the session. Subjects were clearly explained about the study and written informed consent was obtained from the subjects who fulfilled the criteria. Subjects were involved for pre-test and post-test assessment. Both respiratory muscle strength training and vocal function exercises on lung function were done by six sessions per week, twice a day. The total duration is 60 minutes.

2.6 Treatment Procedure.

The exercise consist of four parts: Warm-up: just on the vowel "E," maintain the pentatonic scale F (above middle C) for as prolonged as feasible. Glide from either the lowest to the highest note on the vowel "O" as a stretching technique. Exercises for contracting: Glide from the higher to lower note on the vowel "O." On the vowel "O," maintain the harmonic note middle C-D-E-F-G for as long as feasible. For twelve weeks, individuals were forced to repeat each activity twice in a row, twice per day, six days a week.Exhalation and inhalation tension threshold trainers are often used to address the associated striated muscle in terms of giving appropriate and specific loads to pulmonary function resistance training programs. Pressure threshold lecturers are flow independent and also provide a stable pressure threshold that the researcher or clinician can control and adjust, and it must be exceeded by a specific amount of inspiratory or expiratory pressure while breathing. A one-way, adjustable, spring-loaded valve is commonly associated with a mouthpiece through which one must generate adequate respiratory pressure to ventilate.The bulk of the research on ventilatory strength training techniques incorporates these elements. Numerous trials have used a training program that comprises exercising skeletal musculature at 75% of optimum expiratory or inspiratory pressures, often known as utmost expiratory pressure (MEP) or peak inspiratory pressure (MIP).

2.7 STATISTICAL ANALYSIS

A paired "t" test was used to examine the data. The statistical significance of pre-and post-test values of vital capacity forced expiratory volume in one second, and song-singing scale from Wise and Sloboda was determined using the paired t-test.

2.7.1 Data Presentation

Data analysis and presentation for vital capacity, FEV1, and song-singing scale from wise and Sloboda.

Table 1: Mean difference, Standard deviation between vital capacity, forced expiratory volume in one second, song singing scale from wise and Sloboda.

Parameter	Mean difference	Standard deviation	Paired 't' Value	Table Value	Significance
VC	0.6	0.616	25.22	2.15	Significant
FEV1	0.46	0.068	26.18	2.15	Significant
song singing scale from wise and Sloboda	3.33	0.72	17.84	2.15	Significant

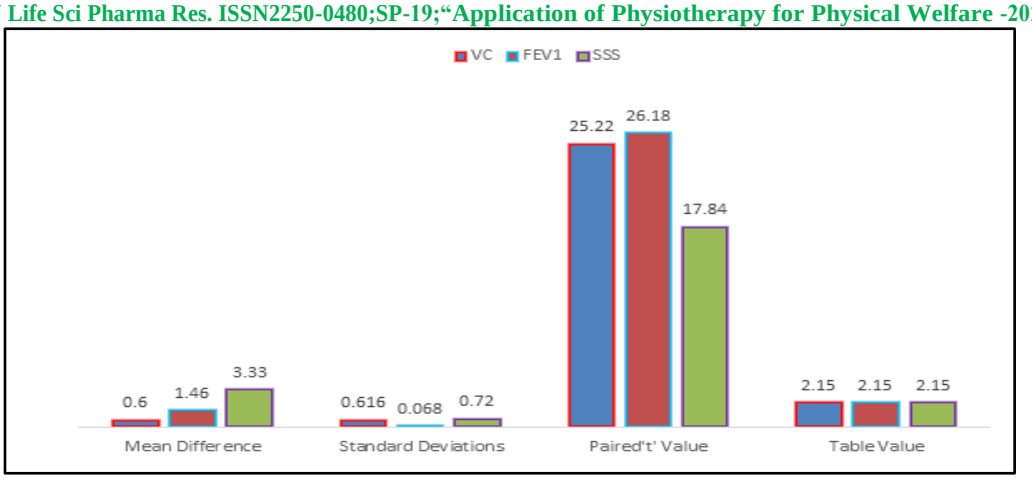

Fig 1: Graphical Presentation of Mean Difference Value and Standard Deviation Value for Vital Capacity, FEV1 and Song Singing Scale from Wise and Sloboda Respectively

3. RESULT

The pre and post-test values were assessed by vital capacity, forced expiration volume at one second, song singing scale from wise and Sloboda, and phonation are measured through a spirometer. The mean difference value for VC is 0.6, FEV1 is 0.46, song singing scale from wise, and Sloboda is 3.33. The standard deviation values for VC is 0.616, FEV1 is 0.068, song singing scale from wise, and Sloboda is.0.72.The paired "t" test values for VC is 25.224, FEV1 is 26. 179, song singing scale from wise and Sloboda is 17.84. The increase in lung function was seen in all the subjects who received the respiratory muscle strength training and vocal function exercises. By analysing the mean values, the result showed the subjects who received the respiratory muscle strength training and vocal function exercises improved the lung function of classical female singers. Byanalysing the values of standard deviation and paired "t" test, the results showed a significant increase in the subject's lung function who received the respiratory muscle strength training and vocal function exercises. Through the results, the alternate hypothesis is accepted, and also there is a significant result in respiratory muscle strength training and classical female singers' lung function is improved through vocal function exercises.

4. DISCUSSION

While consideration of improving the lung function of classical female singers, I observed that there was a significant and positive improvement in classical female singers. M Guzman, V Angadi, D Croake, C Catalan, and others (2020) said that vocal training using VFEs during 10 weeks has a positive effect on physiologic vocal range, as evidenced by an increase in the entire VRP area, and so may help those who have already had professional voice training to reach their full potential.[13] According to Catherine L. Lortie, Julie Rivard, Mélanie Thibeault, and Pascale Tremblay et al., 2017, singing frequently can help to offset the negative effects of aging on the voice, particularly in terms of pitch and amplitude stability, two important voice qualities that can affect communication efficacy. We propose that singing, which is a form of muscle training, aids in the maintenance of muscular strength and voice control even in the face of physiological changes that occur with aging, based on our findings.[14] According to S Salomoni, W Van Den Hoorn, P Hodges, et al.,2016 During silent breathing, there were no significant changes between the patterns of respiratory kinetics of untrained individuals and classical vocalists, albeit there was a pattern for singers to contribute more abdominally than unskilled ones. Untrained people showed minor variations in ribs and core movement coordination when singing, implying that breathing and singing have similar ventilatory processes.[15] According to Mara Behlau and Gisele Oliveira et al.,2009, the phrase "vocal hygiene" has been used to define the field of voice, and it has since evolved to "vocal well-being," which takes into account both the individual and the environment. Due to a lack of data, a systematic effort is needed to test the value of vocal hygiene as a preventive program in professional voice users. Vocal hygiene should be considered a small aspect of a larger vocal rehabilitation program for rehabilitation reasons.[16] Mendes AP, Howard B. Rothman, Christine Sapienza, and W.S. Brown, Jr., et al. 2003, According to the above retrospective survey, four semesters of VT had quite a significant effect on the MPFR. The F0 and SPL of the 90 percentage points, as well as the 90–10% range, grew dramatically as the number of VT semesters improved. Four semesters of VT did not show up to change the

musician's vibrato or formant.[17] The final stage of my thesis works fondly that respiratory muscle strength training and vocal function exercises were effective in treating the classical female singers.

5. CONCLUSION

The study aimed to give the effect on lung function of classically trained female singers by respiratory muscle strength training and vocal function exercises. The group consist of 15 subjects who were assigned by convenient sampling technique accordingly. The total study duration was ten months. Based on the statistical analysis there was a significant difference in the treatment efficacy in respiratory muscle strength training and vocal function exercises. It was observed in the subjects that there was improved singing capability and increased lung volume making it easier to breathe. We here accept the alternate hypothesis which states that "there was a significant difference in effects obtained by the treatment in respiratory muscle strength training and vocal function exercises". So it was concluded that respiratory muscle strength training and vocal function exercises give more effect on the lung function of classical female singers.

6. CONSENT

Written informed consent was obtained from the patient.

7. ETHICAL APPROVAL

This study was conducted after getting permission from the Institutional Ethical Committee and as well informed consent was obtained from the subjects for conducting this study and for the publication of this research work.

8. ACKNOWLEDGEMENT

My sincere thanks to the Chairperson of the Ethical Committee, Secretary, and the members for their guidance and support.

9. CONFLICT OF INTEREST

The authors have no conflict of interest.

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SP-8

Case Report On Clarithromycin Induced Hypersensitivity

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Abstract:
Antimicrobial medications are one of the twentieth century's most significant contributions to medicine. Antimicrobials are the agents which selectively suppress or kill other microorganisms. Toxicity, hypersensitivity, drug resistance, super infection, nutritional deficiency, and infection masking are all issues that arise when antimicrobial drugs are used. Antimicrobials are used in combination to achieve synergy, lower the degree of unwanted effects, prevent resistance from developing, and widen the spectrum of microbial action. Here, we report a case on clarithromycin induced hypersensitivity. Clarithromycin is a semi-synthetic antibiotic belongs to the class of macrolide. Clarithromycin exerts antibacterial action by binding to 50S ribosomal subunit of susceptible bacteria resulting in inhibition of protein synthesis. Acute and persistent bacterial infections are treated with clarithromycin. It is widely utilized in treatment of gram positive and gram-negative bacterial infections. It is commonly administered orally or intravenously. Rarely, Clarithromycin causes allergic reactions such as urticaria and minor skin rashes. Anaphylaxis and Stevens-Johnson syndrome have also occurred. Severe hepatic impairment has also been documented in a few cases. Hepatic failure is usually reversible, but fatalities have been reported. Clarithromycin may also cause tooth discoloration which may be removed by dental cleaning. Here, we report a case of 67-year-old woman who had osteoarthritis and varus deformity. After surgery, the patient developed a low-grade fever, therefore clarithromycin was administered. The patient had urticaria and allergic cough after the first dose. The drug was withdrawn and Pheniramine 2ml was administered to subside the symptoms. This case study demonstrates treatment option for clarithromycin induced hypersensitivity.

Keywords:Allergic cough, Clarithromycin, Hypersensitivity Reaction, Macrolide antibiotic.

INTRODUCTION:

Antimicrobial medications are one of the twentieth century's most significant contributions to medicine. Microbes manufacture these substances, which selectively suppress or kill other microorganisms. Toxicity, hypersensitivity, drug resistance, super infection, nutritional deficiency, and infection masking are all issues that arise when antimicrobial drugs are used. Antimicrobials are used in combination to achieve synergy, lower the degree of unwanted effects, prevent resistance from developing, and widen the spectrum of microbial action. They are classified according to their structure, method of action, spectrum of activity, type of action, and primary target organisms [2]. Macrolides are antibiotic class that has mostly replaced with Beta-lactams in recent years due to their broad spectrum of action and reduced allergic potential. In reality, allergic responses to these compounds have been reported seldom[1]. Clarithromycin is a newer macrolide antibiotic which is structurally similar to erythromycin. Its pharmacokinetic profile is superior to that of erythromycin. Clarithromycin is converted to 14-OH clarithromycin, which is active and functions in tandem with its parent molecule. It subsequently enters the bacterial cell wall and binds reversibly to domain V of 23S ribosomal RNA of 50S subunit of the bacterial ribosome, preventing aminoacyl transfer-RNA and polypeptide synthesis, just like other macrolides. The hepatic microsomal CYP3A4 isoenzyme and P-glycoprotein, an energy-dependent drug efflux pump, are inhibited by clarithromycin [2]. Clarithromycin is efficiently absorbed from the gastrointestinal tract; however, first-pass metabolism reduces its systemic bioavailability (approximately 55 percent). It biodegrades quickly and yield microbiologically active 14-hydroxy-(R)-metabolite because of the medication has a half-life of more than 4 hours; it can be taken twice daily. A pulverised 250-mg clarithromycin tablet was suspended in saline to make clarithromycin [3]. Clarithromycin iv was administered in 500 mg doses over 30 minutes in a 100 mL volume infusion, and 500

or 1000 mg doses over 60 minutes in a 250 mL volume infusion. The mean peak concentration (Cmax) of the parent drug after the 500 mg dose ranged from 5.16 mcg/ml to 9.4 mcg/ml following the 1000 mg dose (16 min infusion). The mean peak concentration (Cmax) of the 14 hydroxy metabolites ranged from 0.66 mcg/ml after 500 mg to 1.06 mcg/ml after 1000 mg. The typical dose of clarithromycin pills is 250 mg twice daily, but this can be increased to 500 mg twice daily in severe infections. Children and adults tolerate clarithromycin well, and it has less gastrointestinal adverse effects than erythromycin. The substance is found in high amounts in plasma, cells, and tissues, including tonsil, lung, and middle ear fluids [4]. Allergic responses to macrolides are uncommon, however they can range from modest cutaneous reactions to systemic life-threatening reactions like anaphylaxis [5]. Clarithromycin is a macrolide antibiotic that is commonly used to treat infections caused by Mycobacterium avium complex or Helicobacter pylori in the respiratory, skin, and soft tissue[4]. Toxicity of clarithromycin includes Pseudo membranous colitis has been reported with clarithromycin use. Allergic reactions ranging from urticaria and mild skin eruptions are rare cases of clarithromycin. Anaphylaxis and Stevens-Johnson syndrome have also occurred. Rare cases of major hepatic dysfunctions also have been reported. Hepatic failure is usually reversible, but fatalities have been reported. Clarithromycin may also cause tooth discoloration which may be removed by dental cleaning [6]. Antibiotic hypersensitivity can lead to significant morbidity, mortality and suboptimal treatment options. Rapid desensitization induces temporary immunological tolerance in a host with type I anaphylaxis [7]. Before initiating antibiotic therapy, drug hypersensitivity is an important consideration, and a common strategy is to avoid giving patients medications when a high likelihood of severe reactions exists. With an increase in antibiotic resistance and a decrease in novel antibiotics, there is greater pressure to consider antibiotics in patients with a history of adverse reactions. The major concerns include IgE-mediated, or type I, reactions, anaphylaxis, Stevens-Johnson syndrome, and toxic epidermal necrolysis.[8] Macrolides are antimicrobial agents that can be used to treat a variety of infections. Allergic reactions to macrolides occur infrequently but can include minor to severe cutaneous reactions as well as systemic life-threatening reactions such as anaphylaxis. Most reports of allergic reactions occurred in patients without prior exposure to a macrolide. Cross-reactivity among macrolides may occur due to the similarities in their chemical structures; however, some published literature indicates that some patients can tolerate a different macrolide. Macrolides are infrequently reported to cause various types of allergic reactions, with cutaneous reactions being the most common. Macrolides are similar in chemical structure, and limited reports have demonstrated cross-reactivity. Strategies to overcome hypersensitivity reactions, such as desensitization, or allergy testing for cross-reactivity to another macrolide have been utilized with successful outcomes. [9]

1. CASE REPORT:

PATIENTS PRESENTING COMPLAINT:

A 67-year-old female patient was admitted with chief complaints of osteoarthritis and a varus deformity in both legs.

MEDICAL HISTORY:

Hypertension and diabetes were among the patient's co morbidities.

SOCIAL HISTORY:

The patient is vegetarian and does not have drinking habits. Her bowel and bladder habits are normal.

SPECIAL TESTS AND INVESTIGATIONS:

LABORATORY PARAMETERS:

The laboratory examination revealed abnormalities:

Parameters	Observed value	Normal value
C-reactive protein	117 mg/L	Up to 5.0mg/L
WBC	11000 cells/mm^3	4000-10000 cells/mm^3
Platelets	254000 cells/mm^3	150000-410000 cells/mm^3
Neutrophils	90.7%	40-80%
S .creatinine	0.84 mg/dl	0.5-1.2mg/d

MICROBIOLOGY REPORT:

The gram-negative bacterium *Klebsiella* species has grown to a population of over one lakh, according to the report. Antibiogram revealed resistance to Cefaperazone sulbactam and Amoxicillin + Clavulanate 625mg.

SPECIMEN: Urine(catheterized)
Growth: more than 1 lakh
Group: Gram negative Bacilli (*Klebsiella* species)

ANTIMICROBIAL AGENT	INTERPRETATION
AMIKACIN	SENSITIVE
GENTAMYCIN	SENSITIVE
MEROPENEM	SENSITIVE
CEFOPERAZONE/SULBACTAM	RESISTANT
PIPERCILLIN/TAZOBACTAM	RESISTANT
AMOXICILLIN/CLAVUNALINIC ACID	RESISTANT
CEFEPIME	RESISTANT
CLOTRIMAXOLE	RESISTANT
CEFOTAXIM	RESISTANT
CIPROFLOXACIN	RESISTANT
NITROFURANTOIN	RESISTANT
LEVOFLOXACIN	RESISTANT
CEFIXIME	RESISTANT

DIAGNOSIS:

Patient informed urticaria and allergic cough during the oral challenge test. Allergic reaction was found during the time of test dose.

PROGNOSIS:

Pheniramine 2 ml is given as per the patient's conditions. Allergic reactions can be identified using skin test, oral challenge test.

TREATMENT PLAN:

The first surgery performed on the patient was a right complete knee replacement with patella resurfacing. Patient was stable after surgery, with a conscious oriented and pulse rate of 94 beats per minute and a blood pressure of 148/50mmHg. She was given cefuroxime 1.2g as prophylaxis during her stay. Tramadol 100mg and Cefuroxime 750mg were prescribed as prophylaxis treatments. After two days, the patient developed a temperature spike of 100 degrees Celsius, which was treated with Acetaminophen 650mg and the fever receded. Cefaperazone sulbactam 1.5g was started as an empirical treatment, and urine (catharized) was sent as a specimen. The gram-negative bacterium *Klebsiella* species has grown to a population of over one lakh, according to the report. Antibiogram revealed resistance to Cefaperazone sulbactam and Amoxicillin + Clavulanate 625mg. Amikacin 15 mg/ml was started as a specific therapy for 5 days. After two days, the patient underwent a second operation for a total knee replacement on her left knee. Patient has soakage and drainage in the wound dressing, implying that the patient had an infection. After three days, it was determined that the patient had basal pneumonia with mild fluid overload and a low-grade fever. Piperacillin Tazobactam 4.5g was prescribed for hospital-acquired pneumonia, and Clarithromycin was recommended for low grade fever. Clarithromycin under the brand name Clarimin was given 500 mg intravenously. The patient develops urticaria and an allergic cough after receiving the test dose of Clarithromycin. The medicine was taken off and 2ml Pheniramine was prescribed as a replacement. The allergic reaction lasted many hours, and the patient eventually became stable.

2. DISCUSSION:

Macrolides are an antibiotic class that has mostly replaced beta-lactams in recent years due to their broad spectrum of action and reduced allergic potential. In reality, allergic responses to these compounds have been reported seldom. Clarithromycin is a new macrolide that has the same 14-carbon-atom lactone ring as erythromycin and is active against a wide range of infections [10]. Clarithromycin has an antibacterial spectrum resembles to erythromycin. It is more effective against *Helicobacter pylori, Moraxula, Legionella, Mycoplasma pneumoniae*, and Gram-positive bacteria sensitive stain. Bacteria that are resistant to erythromycin are also resistant to clarithromycin. Because of first-pass metabolism, clarithromycin has a 50% oral bioavailability. Because it is metabolised by saturation kinetics, the t1/2 is prolonged from 3 to 6 hours at higher doses.

There is the production of an active metabolite. Although around a third of an oral dose is eliminated unaltered in urine, dose adjustments are necessary in cases of liver disease and kidney failure. Clarithromycin is utilized as a triple therapy regimen to eradicate *H pylori* in 2-3 weeks for upper respiratory tract infection and sinusitis, otitis media, whooping cough, atypical pneumonia, skin structure infection owing to staph aureus and streptococcus pyrogens. Macrolides are a class of antibacterial agents which is mainly used in the last years in place of beta-lactams because of a broad spectrum of action and a low allergic reaction. In fact, there are few reports on allergic reactions to these molecules. Clarithromycin does possess some common adverse reactions, such as cough, fever, chills, hoarseness, back pain, micturition problems and several adverse reactions such as stomach tenderness, nausea, vomiting, bleeding, bruising, watery, diarrhoea and other cutaneous problems [11]. Clarithromycin was prepared by suspending a pulverized 250-mg clarithromycin tablet in saline solution [12]. Clarithromycin iv was given in 500 mg doses in a 100 ml volume infusion over 30 minutes, and 500 or 1000 mg doses in a 250 ml volume infusion over 60 minutes. Following the 500 mg dose, the mean peak concentration (Cmax) of parent drug ranged from 5.16mcg/ml to 9.4mcg/ml after the 1000 mg dose (16 min infusion). The 14 hydroxy metabolite's mean peak concentration (Cmax) ranged from 0.66 mcg/ml after 500 mg to 1.06 mcg/ml after 1000 mg. The standard dose of clarithromycin tablets is 250 mg twice daily, however in severe infections, the amount may be increased to 500 mg twice daily. The exact mechanism of hypersensitivity due to macrolides is not clearly understood [13]. In this case report, the patient had developed Hypersensitivity reaction to Clarithromycin as a result of immunological response. These reactions may occur due to interaction with allergens such as pollen, animal dander or dust mites as well as specific meals which are known to cause Type I or Anaphylactic reactions mediated by immune system proteins termed IgE antibodies[14]. This promotes inflammation and swelling by releasing histamine and other chemicals.

3. CONCLUSION:

Macrolides are infrequently reported to cause various types of allergic reactions, with cutaneous reactions being the most common. Macrolides are similar in chemical structure, and limited reports have demonstrated cross-reactivity. Strategies to overcome hypersensitivity reactions, such as desensitization, or allergy testing for cross-reactivity to another macrolide have been utilized with successful outcomes. Hypersensitivity reactions such as allergic cough and urticaria can occur after clarithromycin administration. However, if a macrolide must be used in a patient with a confirmed history of a severe allergic reaction, then allergy testing should be employed to investigate if the patient reacts to other agents in the macrolide class. If the patient has hypersensitive reactions, the medicine should be discontinued or antihistamines should be administered. In the above-mentioned case, the patient suffered from a clarithromycin-induced hypersensitivity reaction which subsided after immediate drug withdrawal and the pharmacist recommended Pheniramine 2ml, an antihistamine to eradicate the Clarithromycin induced Hypersensitivity..

CONSENT:

The author has collected and retained patient's written consent in accordance with the international university standards.

ETHICAL APPROVAL:

The author has gathered and saved written ethical approval in accordance with international or university standards.

COMPETING INTERESTS

They are no competing interest stated by the authors.

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SP-9

A Case Report On Acute Kidney Injury Associated With Intravenous Colistin (Colistimethate Sodium) Treatment

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Abstract:

Colistin is an antibiotic that was widely used owing to a worldwide increase in nosocomial infections and was inhibited to an extent from curative use due to its nephrotoxic effects. Colistin, also known as Polymyxin E, is a Polypeptide antibiotic with broad spectrum and bactericidal activity discovered in 1947, which was sanctioned for therapeutic use in the United States in 1970. The apposite control over Colistin induced nephrotoxicity still persist as challenging besides it is a main adverse event that occurs within a period of 7 days, which is a warning sign for acute kidney injury. It causes ion and water influx leading to edema and cell lysis as an effect of upsurge in tubular epithelial cell membrane permeability. The objective of this case study is to provide an overview of the Colistin induced hazardous facets for nephrotoxicity, and to scrutinize the existing evidence for pre-emptive measures. In this report, we analyse the case of a 57-year-old male patient who was admitted with an open commuted fracture of proximal tibia along with cervical injury, administered with intravenous Colistin for the management of sepsis. The administration of Colistin steered to an abnormal renal functioning which gradually led to an incline in Serum Creatinine level and Blood urea levels that was deescalated after cessation of Colistin administration. Colistin pharmacokinetics in critically ill patients must be better understood in order to develop colistin dose regimens that provide maximum antibacterial action with minimal toxicity.

Keywords: Acute kidney injury, Colistin, Creatinine level, Nephrotoxicity, Urea level

INTRODUCTION:

Colistin, also known as Polymyxin E, is a Polypeptide antibiotic with broad spectrum and bactericidal activity discovered in 1947, which was sanctioned for therapeutic use in the United States in 1970[1, 6]. It is used as a last-resort remedy for multidrug resistant Gram-negative infections [5]. Colistin was isolated from *Bacillus polymyxa* var. *colistinus* in Japan [2]. It has a detergent-like action on the cell membrane. Colistin breaches and interrupts the bacteria cell membrane of aerobic gram-negative bacteria causing water influx leading to edema and cell necrosis[1]. Colistin comes in two forms: Colistimethate sodium, which is administered intravenously called and Colistin Sulfate, that can be used both topically and orally[6]. Colistimethate is slowly converted to its active form, colistin, within the first 48 hours of treatment [17]. The loading dose of Colistin must be tapered, restricting the development of resistance. Because of elevated incidence and rapid onset of nephrotoxicity caused by Colistin treatment, it is critical to comprehend the molecular effect of Colistin on eukaryotic cells, elucidate its cellular transport and sub-cellular deposition, establish appropriate dosage regimens based on stringent pharmacokinetics/pharmacodynamics studies rather than factual substantiation and discover unique and appropriate disease preventive agents as well as organize optimal drug therapy. Colistin is a low molecular weight polycationic antibiotic [14] and has both lipophilic and hydrophobic moieties furthermore it is excreted via renal route as in unchanged form (60%) and has an elimination half-life of about 5 hours. As per FDA, for diseases due to Gram-negative infections, it is administered as 2.5 to 5 mg/kg/day IM or IV in 2 to 4 divided doses; maximum of 5 mg/kg/day of Colistin base. Colistin is efficient in alleviating infections triggered by *Pseudomonas, Escherichia,* and *Klebsiella* species. Although with wide dose and duration variations, Colistin therapy has a relatively good clinical cure rate. Its injectable form has adverse effects including kidney and neurological problems, anaphylaxis, diarrhoea and muscle weakness [7].

Systemic toxicity of Colistin is high: flushing and Paraesthesia are observed [9]. Nephrotoxicity is the major adverse effect produced by Colistin defined using the RIFLE Criteria (Risk, Injury, Failure, Loss and End-stage kidney disease). Renal function impairment can last for a week or even two weeks after colistin is withdrawn, although it normally resolves in 3–9 weeks. Investigational studies employ these criteria for defining the condition of the patient having abnormal renal functioning. Colistin induced nephrotoxicity is too often and is concomitant but not limited to old age, improper dosing and medications like vancomycin, Aminoglycosides etc.[10]. As per literature reviews, several cases have been reported on nephrotoxicity induced by Colistin. As per Colistin doses in investigational trials, histopathological evaluation is the precise way to analyse Colistin nephrotoxicity [4.] Colistin dosage regimens must be established only after monitoring patient's pharmacokinetics [8]. This report focuses on abnormal renal functioning observed after administration of Colistin in a trauma patient which was inverted with cessation of Colistin.

CASE REPORT:

Patient's presenting complaint:

The patient was admitted with a major left leg crush injury with skin and soft tissue loss over anterior and medial aspect of leg and with type 3B open comminuted fracture of proximal one third of tibia and segmental fracture of right fibula along with cervical spine injury and laceration over left upper eyelid.

Medical history:

The patient had an alleged history of road traffic accident, ankylosing spondylitis and a past 4-year history of Diabetes mellitus. He had a head injury-scalp haematoma and a condition of vomiting, neck pain and was not able to move his lower limb.

Special tests and investigations:

The patient underwent wound debridement and external fixator left tibia primary skin suturing over left upper eyelid on the day of admission.

- In MRI scan of cervical spine, exaggeration of dorsal kyphosis and lumbar lordosis were noted with loss of cervical lordosis. There was a carrot stick fracture at the level of C6/C7 level with opening of the disc anteriorly. These features confirmed ankylosing spondylitis.
- In Computed tomography of chest, a parenchymal nodule was seen in the superior segment of right lower lobe measuring 1.3 x 0.8 cm.
- The patient was admitted in ICU for percutaneous tracheostomy where Inj. Lignocaine 2% 5cc was injected at incision site. By modified ciaglia technique, 8Fr tracheostomy tube was inserted. Due to persistent fever spikes, marginal necrosis of ALT flap and excessive pus discharge in the left leg wound area, amputation of left below knee was planned and the surgery was carried out to improve the general condition and daily dressing were done for the stump bearing in mind the Sepsis diagnosed.
- Colistin was administered on 28/06/2021 and was stopped on 30/06/2021 due to abnormal renal function test results. The patient's vitals and laboratory parameters of Day-1 and Day-6 after Colistin administration are given below in Table.1.

Table.1: **Laboratory investigation report revealing elevated Serum creatinine and Blood urea levels after Colistin administration and cessation.**

Parameters	Day-1	Day-6
Serum creatinine	1.82 mg/Dl	1.39 mg/dL
Blood urea	143.86 mg/Dl	88.48 mg/dL
Red blood cells (RBC)	3.33 million/mm^3	2.96 million/mm^3
Haemoglobin (Hb)	9.9g/dl	8.6 g/dl
Haematocrit (HCT)	30.7%	26.7%
Platelet count (PLT)	854000cells/mm^3	600000cells/mm^3
White blood cells (WBC)	19500cells/mm^3	12100cells/mm^3

From the laboratory investigation report above, nephrotoxicity induced by Colistin was confirmed. The drug was eventually stopped and the serum creatinine level and blood urea level declined to 1.39mg/dL and 88.48mg/dL respectively within 6 days confirming that abnormalities in renal function test were only induced by Colistin.

Diagnosis:

The patient was diagnosed with;

- Cervical spine injury C6-C7 AO B3 injury ASIA B neurology.
- Type 3B open comminuted fracture of proximal third of tibia and segmental fracture of right fibula.
- Laceration over left upper eyelid
- Head injury-scalp haematology
- Diabetes mellitus
- Known case of ankylosing spondylitis

Prognosis:

After left leg amputation, the patient was initially administered with intravenous Colistin 9 million units STAT followed by 4.5 million units twice daily and stopped Colistin due to abnormal urine outputs and was further advised for renal function test. The patient had fever spikes (103°C) and was switched to Meropenem along with nebulizer Colistin considering the sepsis diagnosed.

Treatment plan:

The treatment plan implemented for the patient based on his present clinical condition is given in Table. 2. The patient was administered with Intravenous Colistin 4.5 MU BD considering sepsis and fever spikes post left leg amputation.

Table-2: The treatment given to the patient during his course of stay in hospital.

S.NO	Generic Name	Dose	Route of administration	Frequency
1.	Inj. Enoxaparin sodium	40mg	SC	OD
2.	T. Pregabalin and Methylcobalamin	75mg	P/O	OD
3.	T. Pantoprazole	40mg	P/O	OD
4.	Syp. Lactulose	10ml	P/O	BD
5.	Inj/Tab. Acetaminophen	1g	P/O / IV	QID
6.	Inj. Meropenem	1g	IV	TDS
7.	Inj. Colistin	4.5MU	IV	BD

DISCUSSION:

Colistin being a broad-spectrum antibiotic, which is active against gram-negative bacteria was withdrawn due to its nephrotoxic effects and re-introduced as it is the last-resort treatment for several gram-negative infections. Many researchers have tried to identify the risk factors associated with nephrotoxicity induced by Colistin [11]. The factors that played a major role in the occurrence of this adverse event were because of geriatric patients, administration of higher doses of Colistin, presence of medical co-morbidities and an extended treatment period [12]. Colistin binds with lipopolysaccharide of bacterial cell wall of Gram-negative bacteria causing an increase in penetrability of bacterial cell wall and eventually causes cell necrosis [12]. The mechanism of toxicity of Colistin is not known but is ascribed to presynaptic action that interferes with the receptor site and blocks the liberation of acetylcholine to the synaptic fissure [14]. The main factor identified responsible for kidney injury was Age. With Colistin having adverse effects of nephrotoxicity, these factors could have aggravated the existing patient's condition and hence the reason for elevated creatinine and urea levels. The significant reasons for kidney injury are due to chronic tubular injury, scarring of glomeruli and collagen accumulation in the interstitium [18]. The indicators that helped to determine the nature of adverse event were Serum Creatinine and Blood Urea, which showed marked incline with Colistin administration. Some studies state that there is no association of cumulative doses of Colistin with its nephrotoxicity. However, it is essential to observe renal parameters early at consistent interims after commencing therapy [12]. The patient received 9 million units IV STAT of Colistin followed by 4.5 million units IV BD on the second day. The Serum Creatinine level and Blood Urea level were within average normal limits and escalated to 1.82mg/dL and 143.86 mg/dL respectively within 48 hours of administration along with abnormal urine output levels. As per the patient's clinical condition and from laboratory results; Age, colistin plasma concentrations, and baseline creatinine level are three predictors of Colistin-associated nephrotoxicity [3]. Other predictors include daily dose of Colistin, Body mass index, serum albumin level and disease condition [15]. Colistin-induced nephrotoxicity is thought to be dose-dependent and is usually reversible once the drug is stopped [14]. Colistin was stopped within two days after repeated monitoring of creatinine and Urea levels.

Later on, the renal function test parameters came within normal levels which confirmed the elevation in Creatinine and Urea levels induced by intravenous Colistin administration.

CONCLUSION:

Colistin induced nephrotoxicity may be because the drug is mostly eliminated by the kidneys, and high blood levels may worsen renal function. The adverse event was reported by the pharmacist as acute tubular necrosis, as evidenced by decreased creatinine clearance, which is the main mechanism of colistin-induced nephrotoxicity in the case report above. It is advised that Colistin be started at the lowest dose feasible assisting its appropriate use in patients leading to safe and effective use of Colistin. This study demonstrates that mild renal dysfunction occurs in most patients treated with colistin and it gets reversed to normal but that permanent dysfunction is, fortunately, rare. This study also provide a useful framework to allow for comparison among future studies.

CONFLICTS OF INTEREST:

The author(s) received no potential conflicts of interest with respect to the case report and/or publication of this article.

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SP-10

A Case Report On Loperamide Induced Delayed Hypersensitivity Reaction

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Abstract:The present case report investigates Loperamide's rare adverse effect, i.e., delayed type hypersensitivity reaction and aims to further alert the mass about the same. Since it is widely available as an OTC drug, making it prone to irrational use or abuse hence proper medication history interview under medical supervision would be recommended.We report a case of a 56-year-old male, who had been experiencing gastroenteritis-like illness for the last 24 hours accompanied by diarrhea and malaise. He decided to self-medicate and took 4mg loperamide hydrochloride along with 200mg norfloxacin to assist with symptomatic relief. Within 10-15 hours after administration, he was presented with generalised urticaria, lips angioedema and dysphagia. This indicated that the patient has had delayed type hypersensitivity reaction which takes more than 12 hrs to develop and is classified as a Type IV reaction. Here, the patient's symptoms resolved within 2-4 hrs after parentral administration of antihistamines and corticosteroids along with intravenous saline. This study aims to describe the mechanism of action of loperamide as it relates to toxicity, Identify the most common adverse events associated with loperamide toxicity, Summarize the management considerations, including the importance of monitoring, in patients with loperamide toxicity and to explain the importance of improving care coordination amongst the interprofessional team to enhance the delivery of care for patients with loperamide toxicity.

Keywords: Antidiarrheal agent, loperamide hypersensitivity, angioedema, dysphagia, swelling and troubled breathing.

INTRODUCTION

Anaphylaxis may be a severe, potentially life-threatening reaction which will simultaneously affect two or more organ systems (for instance, when there's both swelling and difficulty in breathing, or vomiting and hives). Loperamide is usually considered safe, but was in few cases the explanation for anaphylaxis. It acts directly on circular and longitudinal intestinal muscles, through the opioid receptor, to inhibit peristalsis and prolong transit time; reduces faecal volume, increases viscosity, and diminishes fluid and electrolyte loss; demonstrates antisecretory activity. Loperamide increases tone on the anal sphincter. Overuse/misuse of loperamide is known to cause fatal complications like irregular heart rhythm or arrythmias and cardiac arrest, and the risk may be increased when combined with other medications that can also cause cardiac problems such as norfloxacin. Common side effects include dizziness, drowsiness, constipation, stomach pain, skin rash, or itching. Although loperamide rarely causes severe hypersensitivity reaction, making it prone to abuse.[1,2] The present case report investigates Loperamide's rare adverse effect, i.e., delayed type hypersensitivity reaction and aims to further alert the mass about the same. Since it is widely available as an OTC drug, making it prone to irrational use or abuse hence proper medication history interview under medical supervision would be recommended to overcome the drugs causing adverse drug reactions, that can be probably life threatening. Loperamide is known to interact with certain drugs like Class IA and II anti arrhythmics, antipsychotics (haloperidol, thioridazine), antibiotics like fluoroquinolones (moxifloxacin, norfloxacin) to prolong QT interval and produce cardiac complications.[3] The adverse effects reported during clinical studies with Loperamide were generally a minor and self-limiting kind but was more commonly

observed during treatment of chronic diarrhea. A number of the adverse events reported during the clinical investigations and post marketing experience with loperamide are frequent symptoms of underlying diarrheal syndrome (nausea, vomiting, dry mouth, abdominal pain/discomfort, drowsiness, dizziness). These symptoms are often difficult to distinguish from undesirable drug effects unless accompanied by severe anaphylactic reaction. The type IV hypersensitivity reaction was termed delayed hypersensitivity reaction by Coombs and Gel, which takes 12 or more than 12 hours to develop. Typically, the maximal response time occurs between 48 to 72 hours. Antibodies don't mediate DHR; it's mediated by T cells that cause an inflammatory reaction to either exogenous or autoantigens. This HR to exogenous antigens involves T cells and also antigen-presenting cells (APC) like macrophages and dendritic cells, all produce cytokines that stimulate an area inflammatory response in a sensitized individual. [4,5,6,7,8]ForThis study aims to describe the mechanism of action of loperamide as it relates to toxicity, Identify the most common adverse events associated with loperamide toxicity, Summarize the management considerations, including the importance of monitoring, in patients with loperamide toxicity and to explain the importance of improving care coordination amongst the interprofessional team to enhance the delivery of care for patients with loperamide toxicity.

CASE PRESENTATION

Patient's presenting complaint

A 56-year-old male came to hospital on 20/09/2021 with the chief complaints of face-lips-throat swelling, dizziness and difficulty swallowing and breathing. He had history of dizziness and diarrhea for past two days.

Medical history – previous and current

The patient has medical history of type 2 diabetes mellitus and systemic hypertension, complications were unaccompanied by fever. Past medication history includes Tablet Sitagliptin/Metformin (50/500), Telmisartan, Metaprolol, Gliclazide 60mg, Pantoprazole 40, B complex.There were no other medications reported. Pertinent examination findings included a heart rate of 114 bpm, blood pressure of 153/107 mm Hg and blood sugar level of 250 mg/dl. Norfloxacin was progressively administered until the therapeutic dose was reached. The doses were administered at 30-minute intervals and the patient remained under observation for 35 minutes after the last dose. Norfloxacin was 100 mg was given followed by 200 mg tablet. In case of Loperamide, administration till a total cumulative dose of 6mg was achieved by initiating with 2mg. Blood pressure and heart rate were constantly monitored with dermal conditions before and after each dose. Administration was stopped when as soon as patient presented symptoms.

Diagnosis

Oral challenge test was found out to be positive for loperamide indicating that loperamide was responsible for delayed hypersensitivity reaction caused in patient, concluding a positive on negative dechallenge drug test where 18 hr after initiating oral challenge test, the patient developed generalised urticaria, angioedema of tongue and lips, dysphagia and respiratory distress, similar to the reported symptoms on arrival. No such delayed hypersensitivity reaction (DHR) was observed in the oral drug challenge tests for Norfloxacin.

Prognosis

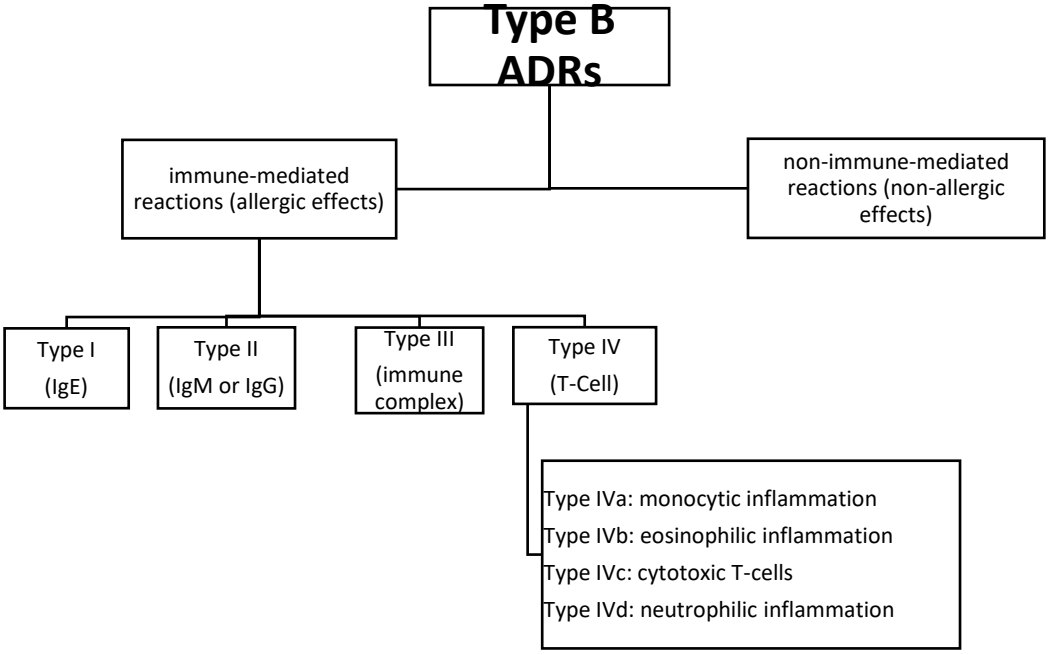
The prognosis in case of drug allergy turns out to be good once the trigger/s are identified using skin prick test or oral drug challenge test, following treatment with anti-histamine and corticosteroid as per patient's condition-based requirement. The trigger has been identified as the drug loperamide via oral drug challenge test.

Treatment plan

He was treated with corticosteroids and intramuscular anti-histamine on presentation to the emergency room and again while showing similar signs during loperamide drug challenge. Soon after, patient's respiratory symptom resolved along with cutaneous signs within 3-4 hrs.

Any allergic type reaction towards loperamide is barely explored and the only cases published are the cited two cases of immediate IgE-mediated anaphylactic reaction to loperamide where both of these cases were presented with severe clinical conditions.[9, 10] This further urges the need to focus on any such reported cases verified by drug challenge or any other test to supplement the evidence on the reporting. MEDLINE search to April, 2003, was reviewed in a literature (Scully C*et. al.,* 2004) which highlightedsome common and significant oral complication like angioedema during drug therapy due to list of the drugs like Penicillin derivatives, Ketoconazole, Quinine, Pyrazolone derivatives, Naproxen, etc. Their study discussed type I hypersensitivity reaction which occurred as soon as the drug therapy commenced. [11]

There is a need to understand delayed type hypersensitivity reaction which usually occurs after 12 hours and can take few hours or days to develop.
small doses until normal dose is reached.
Hypersensitivity drug reaction are type B reaction and may result in severe consequences which are potentially life threatening and fatal[12]



The duration before symptoms onset, 10-15 hr after taking loperamide was too long for considering an immune type I mediated hypersensitivity reaction. Surprisingly, the delay of 18 h before symptoms onset during the oral drug challenge, which is doubled in comparison to his "in real life episodes", suggests that other mechanisms could be involved:

Hypotheses to explain the longer delay during the oral challenge test before symptoms begin could be: [13,14]

Since, oral challenge testing is the only way to confirm tolerance to a quinolone before prescribing it as a safe alternative.[15] Norfloxacin was challenged along with loperamide. Both the drugs were progressively administered until the therapeutic dose was reached following constant blood pressure and heart rate monitoring. But no delayed reactions were observed in the oral challenge tests of Norfloxacin by the end of challenge. Although, oral drug challenge test was found out to be positive for loperamide since it managed to show previous complications on hospital admission in the patient, which was considered delayed-type. The control of drug allergic reaction starts with the suspicion that any unexplained medical manifestation can also additionally constitute a type B, unpredictable drug reaction. For a few reactions, easy withdrawal of the drug can be all that is required for treatment. Acute anaphylactic reactions ought to be handled as defined in (Lieberman P *et. al.,* 2010). Immune complicated reactions typically solve spontaneously as soon as the antigen is cleared. However, remedy with antihistamines and probable glucocorticosteroids and/or NSAIDs can be beneficial for manage of urticaria and angioedema.[16, 17]On timely recognition of hypersensitivity reaction, it could be managed by treatment with IM epinephrine (if severe), antihistamines, supplemental oxygen, fluid resuscitation, corticosteroids and +/- glucagon if on β-blockers.[18]The patient on treatment with corticosteroid and intramuscular antihistamine showed symptomatic relief immediately. There is a need to understand delayed type hypersensitivity reaction which usually occurs after 12 hours and can take few hours or days to develop.We have reported a delayed type hypersensitivity reaction related to an over the counter drug for which very less evidence based literature in the form of case report is present to

supplement the drug based ADR. It would help in understanding further cases where loperamide is a suspected drug to have caused such a reaction. By this, loperamide would be considered a strong competition in case on multiple drug prescription and could be subjected to patch test or oral drug challenge.Healthcare providers widely prescribe loperamide for different types of diarrhea. Even though it is available as an over-the-counter medication, it still requires the attention and oversight of an interprofessional healthcare team. Pharmacists and clinicians need to survey the potential for abuse and educate the patient of its potential toxicity in large doses. Nurses can also provide monitoring and counseling in this area. In September 2019, the FDA approved a new package size limitations and unit-dose packaging for certain over-the-counter loperamide products in an effort to improve patient safety. When prescribing or recommending loperamide, the clinician should have the nurse and/or pharmacist reiterate all safety and dosing issues to ensure proper use of the medication and to optimize patient safety, as patients may think that because of its OTC availability, that it does not represent any potential for misuse. Interprofessional management of loperamide therapy will result in better patient outcomes with fewer adverse effects.

COMPETING INTERESTS

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