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REVIEW ARTICLE

EFFECTIVENESS OF EXERCISES PERFORMED ON AN UNSTABLE SURFACE ON PAIN, LOWER EXTREMITY FUNCTION, BALANCE AND STRENGTH IN POST- MENOPAUSAL FEMALE PATIENTS WITH TIBIO FEMORAL OSTEOARTHRITIS - A LITERATURE REVIEW

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ABSTRACT

Background of the study: Osteoarthritis is one of the most common disease causing disability and functional problems. Exercise therapy has recently become popular. It can improve the general function of the body and activities of daily living by enhancing the range of motion (ROM) and muscle strength of patients having osteoarthritis. Objective of the study was to establish or review existing studies evaluating the effectiveness of exercises performed on unstable surfaces on pain, lower extremity function, balance and strength in post-menopausal female patients with tibiofemoral osteoarthritis. **Methodology:** Various articles from databases like Pub Med, Google scholar, science direct, research gate has been collected for analysis. It has retried through search by using keywords of osteoarthritis, post menopausal women, manual muscle test, pain and balance. Total 20 articles were included in the study and based on their findings a review was made. **Result:** Strengthening of the hamstring in addition to strengthening of the quadriceps is beneficial for improving subjective knee pain, range of motion, and decreases the limitation of functional performance of patients with knee osteoarthritis. **Conclusion:** The present literature review concludes that exercise using unstable surface improved the symptoms of patient with osteoarthritis

Keywords: Osteoarthritis; Range of motion; Lower extremity function; Balance

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INTRODUCTION

OA is the most common form of arthritis. Osteoarthritis is a progressive degenerative joint disease involving the cartilage and surrounding tissues. It results in damage and loss of articular cartilage, remodelling of subarticular bone, osteophyte formation, ligamentous laxity, weakening of periarticular muscles and synovial inflammation.

OA is a non-inflammatory progressive disorder of movable joints, particularly weight bearing joints¹. Hip and knee OA is the most prevalent forms of OA with the overall prevalence of knee OA is 28.7%. In addition, OA knee patients may also experience poor neuromuscular control, slower walking speed, decreased functional activity and walking.

The prevalence of knee osteoarthritis is 22% -32% in India; commonly females are more affected than males as the age progress. More than half of those with arthritis are under 65 years of age. OA knee increases with age (older than 50 years), especially in women.²

It has a multifactorial etiology. The etiology of OA is related to repetitive mechanical loads and aging. The knee is the most common weight-bearing joint affected by OA, with the disease predominantly affecting the medial compartment of the tibiofemoral joint. Patients with knee OA frequently report symptoms of knee pain and stiffness as well as difficulty with activities of daily living such as walking, stairclimbing and housekeeping³. The principle contributors to disability are believed to include pain, reduced range of joint movement, and muscle weakness ⁴. Degenerative OA is more common in women than in men and grows worse with age, if left untreated, the disease may increase the risk of falls and

decrease longevity. As degenerative OA affects the ligaments, articular capsules, muscles and tendons ⁵

Lower extremity muscle weakness may play an important role in knee osteoarthritis. Quadriceps weakness is common in patients with knee osteoarthritis and may contribute to the substantial functional deficits that occur with disease progression⁶. Dynamic stability at the knee joint is provided by the muscles that surround the knee joint. Many muscles acting on the thigh have their insertions around the knee. The quadriceps femoris muscle is the principal muscle involved in knee extension.

The principle muscles involved in knee flexion are the hamstring muscle group. quadriceps weakness is one of the most common and disabling impairments seen in individuals with knee osteoarthritis. Sufficient quadriceps and hamstrings strength, both isometric and dynamic, is essential for undertaking basic activities of daily living, such as standing and walking.

Strengthening the hamstring muscle has been found to enhance the functional ability of deficient knees. This is probably due to overall increases in both hamstring and quadriceps strength, increase in the hamstring to quadriceps ratio (H: Q), and minimization of anterior-lateral subluxation of the tibia.⁴

It is evident that lower extremity strength has a major role in knee joint during weight bearing activities There are three types of basic therapeutic exercise: isotonic, isokinetic, and isometric exercise. Of these three, isometric exercise might be the most appropriate and easy to understand by the patients and can be easily and safely performed at home because it requires no or minimal apparatus. "isometric exercises" are simple and inexpensive to perform and that they rapidly improve strength⁷

Straight leg raises and mini-squats are very commonly prescribed to increase the strength and control of the knee muscles. [Straight leg raises are a movement with a free distal extremity that improves the strength of the knee muscles and protects the knee joint. Mini-squats target only the knee joint and are performed under weight-bearing or simulated weight bearing conditions with a fixed distal extremity.⁸

Retro-walking is sometimes referred to as backward walking, improve sport performance, promote balance and also to stay mentally fit. Back ward walking increases stride rate, decreases stride length and increases support time. Muscular structure supporting ankle and knee reversed their role during retro-walking. Backward walking produces significantly lower patellar compressive force than forward walking and helps to reduce maximal vertical force and impulsive force on knee in comparison to forward walking.

Retro-walking significantly lowers peak patellofemoral joint compressive force and a significantly slower rate of loading has been found during backward walking. Consequently, trauma to the articular cartilage is reduced during retro-walking. Retro-walking could be an effective tool to increase quadriceps strength.¹

Literature review unveils that that the prevalence of knee joint osteoarthritis shows an upward trend in females during perimenopausal period and continues to soar up throughout menopause. Studies suggest that declining levels of estrogen during menopause increases a women's risk of acquiring osteoarthritis.⁹ Patients who have knee osteoarthritis have difficulty in walking and going up and down stairs. These daily activities are related to balance. Balance training is more effective way for knee osteoarthritis. Balance exercise is effective for the decline of knee stability. Improving stability and exercise techniques with conversion of direction, beginning and end of unexpected exercise by using balance board or inclination board helps protect knee joints from noxious loads.

Performing balance exercise can help the stability of knee joints, as well as performance of harder movement in daily activity. Balance exercise on rehabilitation of knee or ankle is essential to restore muscles power and ligament and damaged tissues around the joint.¹⁰

Objective: To establish or review existing studies evaluating the effectiveness of exercises performed on unstable surfaces on pain, lower extremity function, balance and strength in post- menopausal female patients with tibio- femoral osteoarthritis

METHODOLOGY

Data bases searched were from Pubmed, Google Scholar, and Research Gate. Queries used were Osteoarthritis, post menopausal women, manual muscle test, pain and balance. To review the literatures that describe and evaluate "the effectiveness of exercises performed on unstable surfaces on pain, lower extremity function, balance and strength in post- menopausal female patients with tibiofemoral osteoarthritis" Relevant articles in english were received through search of pub med, google scholar, research gate. Total 20 articles were taken and studied out of which experimental studies, comparative study, cross sectional study, review literature; uncontrolled study and longitudinal study were included.

The inclusion criteria were patient of age group between 55-60 years of post menopausal female diagnosed with osteoarthritis exclusion criteria were Acute/ chronic neurological abnormalities, Recent cerebrovascular accident or myocardial infarction, Illiterate, Previous fracture of lower extremities, Participants with balance problem, systemic inflammatory disease, Congenital or acquired deformity of lower extremity, Patients with unstable vital signs. The purpose of the

review was to gain an understanding about the benefits of exercises performed on an unstable surfaces on pain, lower extremity function, balance and strength in post- menopausal female patients with tibio femoral osteoarthritis The following key words are used in combinations : Osteoarthritis, post menopausal women, manual muscle test, pain and balance

RESULT

Total 20 articles were taken and studied. The review study is tabulated in Table 1. About author, title of the study and final conclusion of the study were described below in the Table

Authors	Title	Conclusion
	Lucreat of Datus Malling an	Detre colling lands to a significant
Bairaj Alvi et al.	Impact of Retro-waiking on	Retro-walking leads to a significant
	Pain and Disability	improvement in reduction of pain
	Parameters among Chronic	and disability of the subjects under
	Osteoarthritis Knee Patients	study.
K.Hrishikesh Yadav et al.	Effectiveness of retrowalking	Retro walking as an exercise in
	in osteoarthritis of knee – a	rehabilitation of OA Knee patients
	review article	can reduce excessive abnormal
		adduction torque on knee joint and
		also improve functional activities.
Ashraf ramadan hafez1 et	Treatment of Knee	Strengthening the hamstring muscles
al.	Osteoarthritis in Relation to	in addition to strengthening the
	Hamstring and Quadriceps	quadriceps muscles proved to be
	Strength	beneficial for perceived knee pain,
		range of motion, and decreasing the
		limitation of functional performance
		of patients with knee OA
Ahmedh Al-Johani et al.	Comparative Study of	Strengthening of the hamstring in
	Hamstring and Quadriceps	addition to strengthening of the
	Strengthening Treatments in	quadriceps is beneficial for improving
	the Management of Knee	subjective knee pain, range of
	Osteoarthritis	motion, and decreases the limitation
		of functional performance of patients
		with knee osteoarthritis

Taesung KO et al.	Manual therapy and	Manual therapy together with
	exercises for OA knee: Effects	resistive exercises appears to be
	on muscle strength ,	more effective at improving muscle
	proprioception and	strength, proprioception and
	functional performance	functional
Michael D. Lewek et al.	Quadriceps femoris muscle	Patients with knee osteoarthritis
	weakness and activation	would exhibit quadriceps weakness
	failure in patients with	
	symptomatic knee	
	osteoarthritis	
Shahnawaz anwer et al.	Effect of Isometric	The 5-week isometric quadriceps
	Quadriceps Exercise on	exercise program showed beneficial
	Muscle Strength, Pain, and	effects on quadriceps muscle
	Function in Patients with	strength, pain, and functional
	Knee Osteoarthritis: A	disability in patients with
	Randomized Controlled	osteoarthritis of the knee.
	Study	
Arzu daşkapan et al.	Comparison of Mini-squats	The effectiveness of straight leg
	and Straight Leg Raises in	raises or mini-squats when they were
	Patients with Knee	added to a traditional physical
	Osteoarthritis: A Randomized	therapy program in patients with
	Controlled Clinical Trial	knee OA. Both types of exercises
		exhibited that they can be used to
		reduce pain and disease-related OA
M. Koch et al.	Prevalence of knee joint	The prevalence rate of knee OA was
	osteoarthritis among	estimated to be 28.3% among
	perimenopausal and post-	women in the age group of 40-65
	menopausal women in	years and Prevalence was more in
	Guwahati, Assam, India	postmenopausal women
Young Dae Yuna et al.	The Effects of Resistance	Resistance exercise and balance
	Exercise and Balance Exercise	exercise are effective on
	on Proprioception and	degenerative knee osteoarthritis and
	WOMAC Index of Patients	resistance exercise is the most
	with Degenerative Knee	effective for improving
	Osteoarthritis	proprioception and WOMAC index.
Kristin R. Baker et al.	Quadriceps Weakness and Its	There is a relationship between
	Relationship to Tibiofemoral	quadriceps weakness and knee OA in
	and Patellofemoral Knee	all compartments, with the strongest
	Osteoarthritis in Chinese	association in mixed disease. Pain
		may contribute to some of this
		weakness

Chan-Woo Nam et al.	The Influence of Exercise on	Exercise using unstable surface
	an Unstable Surface on the	improved the symptoms of patient
	Physical Function and Muscle	with osteoarthritis. Exercise on an
	Strength of Patients with	unstable surface might be helpful for
	Osteoarthritis of the Knee	improving the muscle strength and
		alignment of the lower extremities
K. Kotteeswaran et al.	A comparative study to find	patients with knee osteoarthritis had
	the effectiveness of weight	improvement in balance and
	bearing exercises on stable	functional outcome through weight
	platform versus wobble	bearing exercises given on wobble
	board, to improve balance	board along with interferential
	and functional outcome of	therapy compared to the patients
	individuals with knee	who were given weight-bearing
	osteoarthritis	exercises on stable platform along
		with interferential therapy
Vijaya Krishnan et al.	Effect of retro walking versus	The 6-week rehabilitation protocol
	balance training on pain and	comprising retro walking as an
	disability in patients with	adjunct to conventional therapy
	osteoarthritis of the knee: a	resulted in greater pain reduction
	randomized controlled trial	and enhanced functional
		performance of patients with OA
		knee
Dr. Sneha Sameer Ganu et	Effect of Retrowalking on	knee Retrowalking was more effective
Dr. Sneha Sameer Ganu et al.	Effect of Retrowalking on Pain, Functional Disability	knee Retrowalking was more effective than conventional closed kinematic
Dr. Sneha Sameer Ganu et al.	Effect of Retrowalking on Pain, Functional Disability and Functional Mobility in	knee Retrowalking was more effective than conventional closed kinematic chain exercises in reducing symptom,
Dr. Sneha Sameer Ganu et al.	Effect of Retrowalking on Pain, Functional Disability and Functional Mobility in Patients with Chronic Knee	knee Retrowalking was more effective than conventional closed kinematic chain exercises in reducing symptom, improving functional mobility,
Dr. Sneha Sameer Ganu et al.	Effect of Retrowalking on Pain, Functional Disability and Functional Mobility in Patients with Chronic Knee Osteoarthritis	knee Retrowalking was more effective than conventional closed kinematic chain exercises in reducing symptom, improving functional mobility, overcoming physical dysfunction and
Dr. Sneha Sameer Ganu et al.	Effect of Retrowalking on Pain, Functional Disability and Functional Mobility in Patients with Chronic Knee Osteoarthritis	knee Retrowalking was more effective than conventional closed kinematic chain exercises in reducing symptom, improving functional mobility, overcoming physical dysfunction and increasing strength of hip muscles in
Dr. Sneha Sameer Ganu et al.	Effect of Retrowalking on Pain, Functional Disability and Functional Mobility in Patients with Chronic Knee Osteoarthritis	knee Retrowalking was more effective than conventional closed kinematic chain exercises in reducing symptom, improving functional mobility, overcoming physical dysfunction and increasing strength of hip muscles in osteoarthritis of knee after 4 weeks
Dr. Sneha Sameer Ganu et al.	Effect of Retrowalking on Pain, Functional Disability and Functional Mobility in Patients with Chronic Knee Osteoarthritis	knee Retrowalking was more effective than conventional closed kinematic chain exercises in reducing symptom, improving functional mobility, overcoming physical dysfunction and increasing strength of hip muscles in osteoarthritis of knee after 4 weeks of rehabilitation.
Dr. Sneha Sameer Ganu et al. Nehal Shah et al.	Effect of Retrowalking on Pain, Functional Disability and Functional Mobility in Patients with Chronic Knee Osteoarthritis Role of Interferential Therapy	knee Retrowalking was more effective than conventional closed kinematic chain exercises in reducing symptom, improving functional mobility, overcoming physical dysfunction and increasing strength of hip muscles in osteoarthritis of knee after 4 weeks of rehabilitation. Studies show both positive and
Dr. Sneha Sameer Ganu et al. Nehal Shah et al.	Effect of Retrowalking on Pain, Functional Disability and Functional Mobility in Patients with Chronic Knee Osteoarthritis Role of Interferential Therapy in Osteoarthritis Knee - A	knee Retrowalking was more effective than conventional closed kinematic chain exercises in reducing symptom, improving functional mobility, overcoming physical dysfunction and increasing strength of hip muscles in osteoarthritis of knee after 4 weeks of rehabilitation. Studies show both positive and negative findings of the effects of
Dr. Sneha Sameer Ganu et al. Nehal Shah et al.	Effect of Retrowalking on Pain, Functional Disability and Functional Mobility in Patients with Chronic Knee Osteoarthritis Role of Interferential Therapy in Osteoarthritis Knee - A Narrative Review	knee Retrowalking was more effective than conventional closed kinematic chain exercises in reducing symptom, improving functional mobility, overcoming physical dysfunction and increasing strength of hip muscles in osteoarthritis of knee after 4 weeks of rehabilitation. Studies show both positive and negative findings of the effects of interferential therapy in
Dr. Sneha Sameer Ganu et al. Nehal Shah et al.	Effect of Retrowalking on Pain, Functional Disability and Functional Mobility in Patients with Chronic Knee Osteoarthritis Role of Interferential Therapy in Osteoarthritis Knee - A Narrative Review	knee Retrowalking was more effective than conventional closed kinematic chain exercises in reducing symptom, improving functional mobility, overcoming physical dysfunction and increasing strength of hip muscles in osteoarthritis of knee after 4 weeks of rehabilitation. Studies show both positive and negative findings of the effects of interferential therapy in osteoarthritis knee.
Dr. Sneha Sameer Ganu et al. Nehal Shah et al. Yun Lak Choi et al.	Effect of Retrowalking on Pain, Functional Disability and Functional Mobility in Patients with Chronic Knee Osteoarthritis Role of Interferential Therapy in Osteoarthritis Knee - A Narrative Review Effects of isometric exercise	knee Retrowalking was more effective than conventional closed kinematic chain exercises in reducing symptom, improving functional mobility, overcoming physical dysfunction and increasing strength of hip muscles in osteoarthritis of knee after 4 weeks of rehabilitation. Studies show both positive and negative findings of the effects of interferential therapy in osteoarthritis knee. Results suggest that USBF training is
Dr. Sneha Sameer Ganu et al. Nehal Shah et al. Yun Lak Choi et al.	Effect of Retrowalking on Pain, Functional Disability and Functional Mobility in Patients with Chronic Knee Osteoarthritis Role of Interferential Therapy in Osteoarthritis Knee - A Narrative Review Effects of isometric exercise using biofeedback on	knee Retrowalking was more effective than conventional closed kinematic chain exercises in reducing symptom, improving functional mobility, overcoming physical dysfunction and increasing strength of hip muscles in osteoarthritis of knee after 4 weeks of rehabilitation. Studies show both positive and negative findings of the effects of interferential therapy in osteoarthritis knee. Results suggest that USBF training is similar to EMGBF training in terms of
Dr. Sneha Sameer Ganu et al. Nehal Shah et al. Yun Lak Choi et al.	Effect of Retrowalking on Pain, Functional Disability and Functional Mobility in Patients with Chronic Knee Osteoarthritis Role of Interferential Therapy in Osteoarthritis Knee - A Narrative Review Effects of isometric exercise using biofeedback on maximum voluntary	knee Retrowalking was more effective than conventional closed kinematic chain exercises in reducing symptom, improving functional mobility, overcoming physical dysfunction and increasing strength of hip muscles in osteoarthritis of knee after 4 weeks of rehabilitation. Studies show both positive and negative findings of the effects of interferential therapy in osteoarthritis knee. Results suggest that USBF training is similar to EMGBF training in terms of its effectiveness and is helpful for
Dr. Sneha Sameer Ganu et al. Nehal Shah et al. Yun Lak Choi et al.	Effect of Retrowalking on Pain, Functional Disability and Functional Mobility in Patients with Chronic Knee Osteoarthritis Role of Interferential Therapy in Osteoarthritis Knee - A Narrative Review Effects of isometric exercise using biofeedback on maximum voluntary isometric contraction, pain,	knee Retrowalking was more effective than conventional closed kinematic chain exercises in reducing symptom, improving functional mobility, overcoming physical dysfunction and increasing strength of hip muscles in osteoarthritis of knee after 4 weeks of rehabilitation. Studies show both positive and negative findings of the effects of interferential therapy in osteoarthritis knee. Results suggest that USBF training is similar to EMGBF training in terms of its effectiveness and is helpful for treating patients with knee OA.
Dr. Sneha Sameer Ganu et al. Nehal Shah et al. Yun Lak Choi et al.	Effect of Retrowalking on Pain, Functional Disability and Functional Mobility in Patients with Chronic Knee Osteoarthritis Role of Interferential Therapy in Osteoarthritis Knee - A Narrative Review Effects of isometric exercise using biofeedback on maximum voluntary isometric contraction, pain, and muscle thickness in	knee Retrowalking was more effective than conventional closed kinematic chain exercises in reducing symptom, improving functional mobility, overcoming physical dysfunction and increasing strength of hip muscles in osteoarthritis of knee after 4 weeks of rehabilitation. Studies show both positive and negative findings of the effects of interferential therapy in osteoarthritis knee. Results suggest that USBF training is similar to EMGBF training in terms of its effectiveness and is helpful for treating patients with knee OA.
Dr. Sneha Sameer Ganu et al. Nehal Shah et al. Yun Lak Choi et al.	Effect of Retrowalking on Pain, Functional Disability and Functional Mobility in Patients with Chronic Knee Osteoarthritis Role of Interferential Therapy in Osteoarthritis Knee - A Narrative Review Effects of isometric exercise using biofeedback on maximum voluntary isometric contraction, pain, and muscle thickness in patients with knee	knee Retrowalking was more effective than conventional closed kinematic chain exercises in reducing symptom, improving functional mobility, overcoming physical dysfunction and increasing strength of hip muscles in osteoarthritis of knee after 4 weeks of rehabilitation. Studies show both positive and negative findings of the effects of interferential therapy in osteoarthritis knee. Results suggest that USBF training is similar to EMGBF training in terms of its effectiveness and is helpful for treating patients with knee OA.

Olagbegi OM, Adegoke BOA	Effectiveness of combined	CCEs are better than OKCEs and
et al.	chain exercises on pain and	CKCEs for pain reduction in though all
	function in patients with	three exercise regimens are singly
	knee osteoarthritis	effective. CCEs are recommended for
		improving treatment outcome for
		pain in patients with knee
		osteoarthritis
Mahima Mukharjee et al.	Comparative Effect of Burst	The study concluded that
	Transcutaneous Electrical	Interferential Therapy along with
	Nerve Stimulation (Tens)	Exercises is more effective than Burst
	Versus Interferential Therapy	Transcutaneous Electrical Nerve
	(Ift) Along With Exercise In	Stimulation along with Exercise.
	Reducing Pain and Functional	
	Impairtment in Subjects with	
	Knee Osteoarthritis	
Jun Iwamoto et al.	Effectiveness of exercise for	Muscle strengthening and aerobic
	osteoarthritis of the knee: A	exercises are effective in reducing
	review of the literature	pain and improving physical function
		in patients with mild to moderate OA
		of the knee

 Table 1. Data collected from authors of articles from different Journals

DISCUSSION

This study was to investigate the influence of exercises on unstable surfaces along with conventional therapy and conventional therapy alone on pain, lower extremity function, balance and strength in post- menopausal female patients with tibiofemoral osteoarthritis. Of the many movements of the body needed for ADL, the movements of the lower extremities are related to gait performance. Especially, knee joint movement is involved in many activities of daily living. For this reason, osteoarthritis commonly occurs in the knee and pelvic joints which are responsible for weight bearing.

If there is a problem in the knee joint, gait is easily impaired in activities of daily living such as stair-climbing, sit-to-stand and standing Exercise using unstable surface proved the symptoms of patient with osteoarthritis .Exercise on an unstable surface might be helpful for improving the muscle strength and alignment of the lower extremities as well as positively affecting physical function related to the knee joint¹²

Subjects with OA knee have impairment of proprioception within the joint or weakness in the quadriceps muscles as compared with those without OA knee. These impairments associated with the disease may explain poorer balances within these individuals, evidences suggest the possibility that quadriceps weakness is the primary risk factor for knee pain, disability, balance and progression of joint damage in individuals with osteoarthritis of $\mathsf{knee}^{^{13}}$

Individual with OA knee walked more slowly, with less knee excursion, increased adduction moment and with more joint stiffness. These secondary compensatory gait adaptations in OA knee patients helps in reducing pain by decreasing ground reaction loading on knee. This prolonged usage of secondary gait compensation creates greater imbalance of muscle, progressively reduces muscle strength, endurance, flexibility and later ending to deformity.

During forward walking knee joint flexes, extends and then flexes in support phase, whereas in backward walking knee initially extends, flexes and extends in support phase, prior to flexing and extending during swing. However support swing ratio of retrowalking is similar to forward walking with 60% support and 40% swing. Retrowalking produce significantly lower patellar compressive force than forward walking.

Retrowalking helps to reduce maximal vertical force and impulsive force on knee compare to forward walking because of toeheel contact pattern. According to a study by Neptune and Kautz (2000), backward walking allows increased hamstrings activation which generates reduced patello- femoral and lower tibiofemoral compression load stress and ACL strain, and therefore BW reverses the shear forces in the knee joint.¹⁵

Muscle plays a major role in the structure and function of joints, as demonstrated by the disuse atrophy of the quadriceps femoris muscle that accompanies knee joint pain. Weakness of the quadriceps muscle has been noted by the American Academy of Orthopedic Surgeons as a risk factor structural damage of the knee joint. Muscle weakness affects the antero posterior stability of the knee joint and makes patients feel unstable, leading to decreased personal confidence and decreased performance and independence in daily activities, causing disability and dysfunction in patients with knee OA.

The ratio of the quadriceps to hamstring muscle strength is important for the stability of the knee and for protection from excessive stress³ Quadriceps weakness is one of the most common and disabling impairments seen in individuals with knee osteoarthritis (OA). Sufficient quadriceps and hamstrings strength, both isometric and dynamic, is essential for undertaking basic activities of daily living, such as standing and walking⁴isometric quadriceps exercise brought significant improvements in all the parameters after the 5-week training program.

The prevalence rate of knee OA was estimated to be 28.3% among women in the age group of 40-65 years. The prevalence of knee OA increased with increasing age. Prevalence was more in postmenopausal women. Sedentary lifestyle and greater BMI also emerged as factors associated with knee OA.⁹

Ethical clearance: There was no risk of conducting this study. Ethical clearance was obtained from the ethical Institutional ethical committee of Cooperative Institute of Health Sciences, Thalasseri, Kerala with letter Reference Number: 5, MSK/CR/ NEU/MPT/ CIHS/ 2020, Dated 17/05/2021.

Conflicts of Interest: There is no conflict of interest to conduct this study.

Fund for the study: This is self-funded study.

CONCLUSION

The present literature review concludes that exercises performed on an unstable surfaces reduces pain, improves lower extremity function, balance and strength in postmenopausal female patients with tibio femoral osteoarthritis.

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