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ORIGINAL

EFFECTS OF AQUATIC-BASED EXERCISES ON POSTOPERATIVE RECOVERY AND MOBILITY IN ELDERLY PATIENTS WITH OSTEOARTHRITIS

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ABSTRACT

Preoperative physical function has been shown to predict postoperative outcomes, and exercise can help enhance it. However, people with KOA find it difficult to exercise on land because to discomfort and stiffness, but aquatic exercise is more tolerated. We hypothesized that preoperative water exercise to increase physical function would lead to better postoperative outcomes following total knee arthroplasty (TKA). We included 50 patients who were scheduled for elective TKA in 4-8 weeks and scored at or below the 50th percentile on the mobility assessment measure (MAT-SF). For measuring the research study used Smart PLS software and generated results included descriptive, correlation also that explain the smart PLS Algorithm Model. All enrolled participants were evaluated for 1) clinical osteoarthritis symptom severity using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), 2) physical function using the Short Physical Performance Battery (SPPB) etc. AEI sessions lasted 60 minutes, three times a week, for 4-8 weeks. Participants in both groups were examined one week before and four weeks after their procedure. A 4–8-week aquatic exercise intervention improved functional outcomes, depression, and cognition in elderly individuals receiving TKA. Bigger research is needed to investigate the impact of water exercise on clinical and functional outcomes following TKA. Overall research found directly effect of aquatic exercise on postoperative recovery also that mobility in elderly patients.

KEYWORDS: Aquatic-Based Exercise (ABE), Postoperative Recovery (PR), Mobility (MM), Elderly Patients (EP), Osteoarthritis (OO)

1. INTRODUCTION

Throughout their lives, one in two persons worldwide will experience mild to severe osteoarthritis in their knees. The degenerative joint condition known as knee osteoarthritis (OA) is caused by the deterioration of the cartilage between the knee joints, which serves as a natural cushion and shock absorber. Compared to healthy individuals of the same age and sex, those with severe knee OA often have the most physical handicap since the knees are big weight-bearing joints. The illness is severe and progressive, causing pain, stiff joints, and a reduction in general functioning ability. According to epidemiological research on knee OA, even though the illness may advance slowly, significant knee radiographic abnormalities will ultimately result in total joint failure and maybe the psychological aftereffects that go along with it, such a worse quality of life. Total knee arthroplasty (TKA) is a surgical technique that may be considered if all non-surgical therapies and treatments are ineffective in alleviating the incapacitating symptoms. In the United States alone, this procedure—which is regarded as the gold standard for treating OA—is carried out more than 670,000 times annually, and its frequency is predicted to increase as the "baby boomers" age. This surgical method aims to enhance quality of life and reduce discomfort for patients with end-stage knee OA. The healing process, however, may be protracted and challenging. According to earlier research using age and sex-matched controls, individuals who have surgery are more likely to experience long-term deterioration in their quadriceps strength and functional ability, which might last for years. After surgery, if these physical problems continue, quality of life (QoL) is basically diminished. Therefore, to get rid of these symptoms and prevent long-term problems, high-quality and efficient physical therapy is required (Geigle et al., 2022). To lessen functional restrictions, people with TKA are frequently advised to begin physical therapy and adhere to an exercise regimen designed to restore strength and mobility. Traditional land-based physical therapy usually includes gait and balance training to increase general functional ability, as well as targeted activities to restore healthy muscle strength and joint range of motion (ROM). However, increased discomfort and considerably limited range of motion are frequent postoperative TKA symptoms, which makes weight-bearing activities very difficult for the patient. As a result, this might promote early exercise program termination and impede the healing process. In order to promote a healthy and bearable recovery, it is crucial to design an activity regimen that will allow the patient to reduce the strain on the operated knee. Compared to a land-based program, water rehabilitation has become more popular in recent years as a means of promoting a more successful recovery following total knee arthroplasty. The first few days after surgery are particularly important for the best recovery since TKA encourages rapid physical activity. In research comparing aquatic treatment administered early (6 days post-op) vs late (14 days post-op) following total hip arthroplasty (THA) and total knee arthroplasty

(TKA), the early group showed greater increases in functional ability. Due to the buoyancy of the water, which supports participants and enables them to execute three activities that may be difficult on land, exercise adherence may be better in an aquatic setting. Because of the decreased joint stress caused by the hydrodynamic and hydrostatic pressures of submersion in water, which lessen lower extremity oedema and encourage blood flow, participants frequently experience greater mobility in the pool. Early in the rehabilitation process, this will also motivate participants to walk reciprocally without assistance if they do not have any gait abnormalities. Additionally, the development of the aquatic pool's moveable bottom can allow for changes in water depth, allowing for the regulation of the amount of human weight supported in the water. Because the water depth may specifically match their weight-bearing tolerance, participants may feel more solid and supported throughout recovery. In the end, the physical characteristics of a warm therapeutic pool may be able to soothe and nurture participants, allowing them to begin weightbearing exercises early on without worrying about the pain and swelling that would otherwise accompany other conventional rehabilitation techniques. The benefits of an aquatic rehabilitation program on individuals following total knee arthroplasty have been studied in the past. examined the results of two weeks following total knee arthroplasty (TKA) between a land-based and a water-based fitness regimen, and discovered that the water-based group had short-term advantages. Valtonen, Poyhonen, Sipila, and Heinonen (2010) investigated how aquatic resistance training affected mobility following total knee arthroplasty (TKA) and found that progressive aquatic resistance training improved mobility. The use of combined aquatic and land therapy has also been evaluated in the literature. After four days following surgery, researchers compared the effects of particular aquatic exercise with conventional land-based exercise in patients with TKA and THA (Heywood et al., 2017). According to this study, the aquatic group had better results in terms of an earlier recovery of hip strength. In a study comparing the results of land treatment alone vs a combined aquatic and land 4 therapy program, the researcher discovered that the integrated group had improved range of motion (ROM) and less functional restrictions. Despite the encouraging findings of both investigations, the results could have been distorted by the research designs. Research looked at TKA and THA combined, which could have distorted the findings and compromised the study's validity. The study conducted a six-week intervention; however, it did not account for the individuals' number of weeks following surgery. These and similar studies have been a useful place to start when evaluating the possible benefits of water-based rehabilitation. Updating the research to examine the benefits of water exercise as an alternate rehabilitation technique in people with TKA has, however, been put on hold in recent years. Additionally, the majority of recent research has not yet included a comprehensive evaluation of knee strength, range of motion, functional balance, including gait, and quality of life. The peak ideal improvements in these

physical and psychological outcomes after TKA therapy are also the subject of very few investigations (Chaudhry et al., 2022).

2. Literature Review

The reason for this postmodern-examination was to decide the viability of utilizing oceanic treatment pursuing a whirler sleeve fix to increase scope of movement & utilitarian results. Oceanic treatment was viewed as a successful mediation to increment scope of movement & capability pursuing whirler sleeve fix whenever utilized in agreement along biological repair. Prospective exploration is expected to additionally survey what sort of people are ideal contender to descended from dart dimensions & Kleenex peculiarity(Miner, 2024). Studies explain that to work on reliable, proof impelled marine intercession toward people encountering restrictions optional to Hip Osteoarthritis, the scholars suggest that plan specific or human hours to survey such deliberate survey outcomes, lay out an easy to use measurements caption involving these base power & oceanic climate boundaries, & examine the proof impelled proposed results & incorporate different explicit normalized results toward their adeptness, also a way to report these results effectively(Geigle et al., 2022). Researchers reveal that water is a great mode to accomplishing maximum workout degrees in such regardless of handicaps. Oceanic treatment gives a helpful & secure climate toward starting a workout treatment scheme & may supplement whole periods of the recovery interaction whilst giving an edge of restorative security that's more extensive than practically some other kind of therapy climate. The actual estates of Water give specific advantages to sufferers that ground-founded schemes don't propose, doing oceanic treatment the best recovery climate to some people & circumstances(Heath & Pataky, 2024). The objective of this study is to explore the viability of oceanic practice in further developing down appendage potency in individuals along Musculo-skeletal requirements. All things considered, the deficient use of obstruction in Water is a huge supporter of the restricted viability of oceanic activity mediations in working on Hip & Knee brawn potency in individuals along Musculo-skeletal requirements. Prospective examination is expected to evaluate obstruction along oceanic activities & to decide whether involving valuable open doors toward more prominent opposition in oceanic restoration & fitting obstruction preparing standards might be greater powerful in further developing brawn potency(Heywood et al., 2017). Studies indicate that knee osteoarthrosis reasons torment, solidness & brawny shortcoming that brings about decreased exercises of day-to-day subsistence. Studies expects to analyze the impact of oceanic activity & Santorini-strip works out on torment power, perseverance, & personal satisfaction amid fat individuals along knee osteoarthrosis. In such cross-cutting explore, a sum of 45 corpulent members along knee osteoarthrosis were deliberately enrolled & haphazardly doled out toward 3 gatherings; Oceanic activity bunch, Santorini-strip practice bunch, &

the benchmark bunch(Krishnan, 2024). The aim of this explore is to contrast the consequences of arid ground & oceanic restoration. The speculation is that oceanic restoration is powerful & might lessen the recovery period afterwards knee tendon recreation. The results of this study show that the two arid ground & oceanic treatment are successful toward the restoration of sufferers afterwards knee tendon recreation, yet there isn't one treatment better than another(Pipino et al., 2023). The motivation behind this explore was to deliberately survey riffled, restrained examinations to decide the viability of After-employable short-term care on abrupt-& extensive haul practical recuperation. Ideal short term non-intrusive treatment conventions should to involve: fortifying & escalated practical activities provided over ground-founded or oceanic projects, the power of that is expanded in view of sufferer advancement. Because of the profoundly personalized qualities of these kinds of activities, short term non-intrusive treatment acted in a infirmary over the management of a prepared actual specialist might give the better extensive haul results afterwards the medical procedure(Pozzi et al., 2013). The aim of this contextual investigation was to portray the restoration of a gerontological sufferer who went through total knee joint replacement & profited from the utilization of hydropathy in his recuperation. The principal result estimates utilized for this situation were force, scope of movement, torment & the Short Term Non-intrusive treatment advancement in Moving Appraisal Logarithmic Device. The sufferer was at last ready to form a full re-visitation of his exercises in spite of not recovering the total scope of movement anticipated afterwards all out Knee joint replacement(Kennedy, 2017). Studies assess the viability of physical therapy practice afterwards release from clinic on capability, strolling, scope of movement, personal satisfaction & brawn force, toward sufferers pursuing optional essential all out Hip join replacement to OA. Frustratingly, inadequate proof actually forestalls the adequacy of physical therapy practice pursuing release not entirely set in stone toward this sufferer gathering. Top caliber, sufficiently controlled, preliminaries with extensive haul carry through are necessary(Lowe et al., 2015). Studies describe the ongoing logical comprehension of the significant Physiological alterations that happen over oceanic engrossment. Oceanic engrossment makes significant organic impacts, stretching out beyond basically whole homeotherm frameworks. Oceanic treatments are useful in the administration of sufferers along Musculo-skeletal issues, neurological issues, cardiorespiratory bacteriology, & different circumstances(Becker, 2024). This analysis depicts in what way the use of the estates of Water may uphold the utilitarian recuperation procedure afterwards knee tendon rehabilitation. Hither it's suggested that the fundamental estates (thickness, hydraulic tension, lightness & consistency) of oceanic treatment, whenever employed accurately to recovery rehearses, might be utilized to accomplish 6 essential objectives afterwards knee tendon rehabilitation(Buckthorpe et al., 2019). Studies suggest that along the advantages of actual estates of Water, oceanic ahead step up workout might

be greater appropriate toward sufferers along down appendage shortcoming or torment. The reason for this research is to examine the impact of moderate advances by the minute on a superficial level electron optics of glute maximum, hamstring muscle, vastus intermedius, & triceps surae, whilst doing ahead step out practice along various advances by the minute in Water & ashore(So et al., 2023). Scholars suggest that there's diminutive proof of the fitness & prosperity advantages of floating being game. Floating is a famous game; although, the public authority has clarified that its subsidizing is in danger in the event that it can't be displayed that it gets to the next level individuals' lifetime. Riffled, restrained preliminaries give the most grounded proof & must to be led. Reviews give significant data & scholars have to recognize floating being game & floating being workout(Moffatt, 2017). Studies elaborate that articulary crack administration might be testing whenever the sufferer longings to get back to elevated stacking or monotonous utilization of professional or athletics exercises that include the harmed Joint. Combined protection & OA avoidance act like the essential focal point of restorative intercession. Studies extensively surveys articulary break recovery contemplations(Nyland & Kaya, 2019). This orderly survey & postmodern-examination expected to evaluate contrasts in the two abrupt-& extensive haul goal & Self-announced estimates among essential total Hip joint replacement sufferers along stately administered non-intrusive treatment contra unaided dwelling workouts afterwards release. The standard utilization of managed non-intrusive treatment might not give whatever medically huge advantage through solo activities pursuing essential Hip joint replacement. These outcomes propose that suppliers should to reexamine the standard utilization of directed exercise based recuperation afterwards release(Chaudhry et al., 2022). Studies plans to analyze the adequacy of restorative amphibian activity to recuperation from gyrator handcuff wound. Studies also demonstrated that the expansion of restorative oceanic practice gave additional advantages in decrease of shove agony & obtain of scope of movement also, capability. Be that as it may, because of the absence of accessible investigations on oceanic workout treatment projects' viability in sufferers along gyrator handcuff wound no solid end might be form, featuring the requirement to additional examination in this area(Graça et al.). Studies provides a ten undertaking movements framework that may shape a significant part of the development founded re-preparing procedure, giving design & sufferer independence (Fang et al., 2023). The errand founded movement was shaped via consolidating hypothesis, the most ideal that anyone could hope to find proof, & huge exercise encounter employed to development re-preparing afterwards knee tendon rehabilitation. This procedure upholds sufferer independence, clinical group correspondence & cooperation & may give design toward the development re-preparing procedure(Buckthorpe et al., 2020). Studies purpose is to decide whether a perinatal vigorous neoprene-based texture ortheses is compelling to overseeing torment from normal perinatal diseases. The results of this study show that fatiguing a vigorous neoprene-

based texture ortheses postnatal might help to diminish torment & breaking point the effect of perinatal complexities especially toward ladies beginning with more elevated degrees of torment. Vigorous neoprene based texture ortheses might be a helpful Non-pharmacologic remedial choice to the administration of torment perinatal(Szkwara et al., 2019). Studies claim that oceanic recovery is a broadly involved device toward wound counteraction or restoration. The hidden myoneural components over drenching are little recognized because of systemic problems. The accompanying review fundamental reason to survey myoneural capabilities & brawn design alterations inside drenched state. The actual estates of Water toward the mortal corpse are surely known, also its impact on the cardio-pulmonary framework(Jozefiak, 2017). Scholars explain that inveterate miserable back-torment analyzed as narrowing of Lumber Spine is an incapacitating requirement that prompts torment with movement & consequent action constraint. Actual advisors are exceptionally able to assess actual capability in people along narrowing of Lumber Spine & give personalized practice remedies that may work on utilitarian results, actual work ways of behaving, & generally cooperation locally(Hammerich, 2014). Studies aim is to examine the medical viability & Cost-adequacy of an organized activity scheme contrasted and regular consideration on above appendage capability, wellbeing associated results & overheads in ladies going through invasive carcinoma medical procedure. This study gave hearty proof that reference to ahead of schedule, upheld practice afterwards invasive carcinoma medical procedure further developed jostle capability in that in danger of jostle issues & was related with diminish medical services overheads than normal consideration & further developed wellbeing associated personal satisfaction(Bruce et al., 2022). The point of this research was to examine connections among an actual wellness evaluation estimate & an errand explicit actual appraisal. Oxygen consuming perseverance, down-corpse brawn strength, hold force & chest area brawn perseverance are estimates related with, & prescient of, physical competency test execution; an evaluation intended to copy cops work necessities(Orr et al., 2019). Studies objective is to decide the impact of various communication outlining qualities on prospective active work interest. The results of this research indicates that no steady agreement was discovered, be that as it may, significant qualities to contemplate while forming a communication to impact actual work support are depicted. Additional examination is required(Williams et al., 2019). Studies show that non-transmittable sicknesses are the main worldwide reason for demise & excessively distress that subsistence in less-pay & diminish-center pay nations. Sound life-style ways of behaving, involving devouring a top notch nutriment, smoke-free, taking part in temperate to vivacious actual work, & savoring liquor balance, have been related along a diminish chance of non-transmittable sicknesses, a decrease in declining, & a decrease in related fatality(Agarwal, 2021). The study investigates the apparent catalysts & hindrances to giving schoolroom associated active work toward learners in the

former Years of elementary education. Deficient period, restricted proficient advancement open doors & admittance to assets are the primary boundaries to giving schoolroom founded active work to learners. Although, the essential catalyst incorporates holding academy management sustain to kids' active work advancement at a hierarchical degree(Macdonald et al., 2019).

3. Descriptive Statistical Analysis

Table 1: Results of Descriptive Statistical Analysis

NAME	NO.	MEAN	MEDIAN	SCALE MIN	SCALE MAX	STANDARD DEVIATION	EXCESS KURTOSIS	SKEWNESS	CRAMÉR-VON MISES P VALUE
ABE1	1	1.580	1.000	1.000	3.000	0.666	-0.506	0.744	0.000
ABE2	2	1.440	1.000	1.000	3.000	0.571	-0.128	0.907	0.000
ABE3	3	1.580	2.000	1.000	3.000	0.569	-0.757	0.346	0.000
ABE4	4	1.360	1.000	1.000	3.000	0.557	0.805	1.301	0.000
PR1	5	1.480	1.000	1.000	3.000	0.574	-0.414	0.735	0.000
PR2	6	1.600	2.000	1.000	3.000	0.600	-0.608	0.458	0.000
PR3	7	1.560	2.000	1.000	3.000	0.605	-0.522	0.599	0.000
PR4	8	1.480	1.000	1.000	3.000	0.608	-0.133	0.905	0.000
MM1	9	1.780	2.000	1.000	3.000	0.642	-0.623	0.243	0.000
MM2	10	1.620	2.000	1.000	3.000	0.629	-0.590	0.522	0.000
MM3	11	1.460	1.000	1.000	3.000	0.607	0.017	0.988	0.000
EP1	12	1.340	1.000	1.000	3.000	0.514	0.260	1.145	0.000
EP2	13	1.520	1.000	1.000	3.000	0.608	-0.366	0.747	0.000
EP3	14	1.600	2.000	1.000	3.000	0.632	-0.556	0.587	0.000

The above results of table 1 represents that descriptive statistical analysis result demonstrate that mean values, median rates, the standard deviation rates, the skewness values, also that explain the probability value of each variable. the ABE1,2,3,4 result describe that its mean values are 1.580, 1.440, 1.580 also that 1.360 result shows positive average value of mean. The standard deviation rate is 66%, 57%, 56% also that 55% deviate from mean values. The PR1,2,3 and 4 is

mediator variable result shows that its mean value is 1.480, 1.600, 1.560, 1.480 the result describes that positive average rate. The standard deviation rates show 57%, 60% deviate from mean. The MM1,2,3 is dependent variable result shows that its mean value is 1.340, 1.520 and 1.600 its present that positive average value of mean. The standard deviation shows that values included 51%, 60% and 63% deviate from mean values. According to the result overall minimum value is 1.000 the maximum value is 3.000 the result also describes that overall probability rate is 0.000 its shows 100% significant level between them.

4. Correlation Coefficient

Table 2: Results of Correlation coefficient

	ABE1	ABE2	ABE3	ABE4	PR1	PR2	PR3	PR4	MM1	MM2	MM3	EP1	EP2	EP3
ABE1	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ABE2	-0.040	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ABE3	-0.149	0.138	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ABE4	-0.239	-0.058	-0.028	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
PR1	0.213	-0.156	0.311	-0.228	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
PR2	-0.070	-0.128	0.094	0.132	-0.139	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
PR3	0.187	-0.019	-0.014	0.055	0.320	-0.374	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
PR4	-0.243	-0.205	0.062	-0.038	-0.144	0.033	-0.133	1.000	0.000	0.000	0.000	0.000	0.000	0.000
MM1	0.018	0.100	-0.089	0.054	0.124	-0.333	0.214	-0.242	1.000	0.000	0.000	0.000	0.000	0.000
MM2	-0.286	0.131	0.225	0.162	-0.104	0.074	-0.177	-0.098	0.338	1.000	0.000	0.000	0.000	0.000
MM3	-0.017	0.281	0.212	-0.017	-0.060	-0.099	-0.102	0.215	-0.048	-0.066	1.000	0.000	0.000	0.000
EP1	-0.050	-0.169	0.078	-0.078	0.125	-0.013	0.159	0.054	-0.016	0.090	-0.117	1.000	0.000	0.000
EP2	-0.004	-0.083	0.285	-0.080	0.431	0.077	0.133	0.136	-0.117	-0.006	0.056	0.202	1.000	0.000
EP3	0.123	-0.066	-0.300	-0.159	-0.187	0.053	-0.042	0.239	0.079	-0.181	-0.094	-0.197	-0.187	1.000

The results of table 2 demonstrates that correlation coefficient analysis in between dependent and independent variable result shows that some positive and some negative relation between them. Additionally, it was shown that aquatic exercise

was more successful in reducing pain than land-based exercise. According to earlier research, the temperature of the water as well. As other features like waves and pressure may help to reduce pain by relaxing muscles and calming nerve endings. Furthermore, muscular relaxation and perceived pain reduction promote joint mobility and may aid in muscle strengthening. The aforementioned conclusion that water exercise may be a useful intervention strategy for lowering pain and discomfort in osteoarthritis patients is thus supported by this study. Three studies that evaluated the impact of water exercise on osteoarthritis patients' quality of life were subjected to a meta-analysis. A person's overall well-being is indicated by their quality of life, a multifaceted term that includes mental, social, spiritual, and physical components. Osteoarthritis causes pain in the afflicted joints, physical impairment, and a reduction in quality of life. It is also accompanied with functional restriction of the joints. Future research on the quality of life of patients with osteoarthritis is required, as only three of the 20 studies that were part of the study evaluated quality of life. It was discovered that the length of the aquatic exercise interventions affected how well they affected people's quality of life. As the length of the intervention grew, the quality-of-life score rose in comparison to control groups that received no therapy. It may be challenging to draw firm conclusions from the limited number of studies included in the analysis because they conducted six-, eight-, and twenty-week regimens. These results, however, imply that people with osteoarthritis require ongoing aquatic exercise rather than short-term activities. However, keep in mind that aquatic exercise is only possible in pools with the proper depth and water temperature. As a result, the cost and accessibility of such facilities should be taken into account, as these factors may make it impossible to practice these exercises on a regular basis. It is necessary to establish a social consensus and increase public medical support in light of the aforementioned findings. Furthermore, as time passes, people become less conscious of the need of aquatic exercise, which lowers their performance rate. Therefore, it is necessary to identify and implement behavioral methods and educational initiatives that reinforce elements that might boost motivation and, consequently, the effectiveness of the interventions. Patients with osteoarthritis reported improved joint function after engaging in aquatic exercise. In this respect, a meta-analysis found significant differences between the aquatic exercise group and the control group, but not between the aquatic exercise group and the land-based exercise group. Any type of exercise can enhance joint function by increasing joint strength and range of motion. However, osteoarthritis is more common in overweight persons. Water's buoyancy helps to reduce joint impacts by supporting body weight, which eases discomfort and makes mobility easier. This might be one of the reasons why exercising in the water is better for enhancing joint function than exercising on land. However, as was already indicated, there are time, money, and space constraints associated with aquatic exercise. Therefore, suitable steps to get around these restrictions need to be

taken into account. Locally based intervention strategies that take advantage of the special qualities of water to replicate the benefits of aquatic exercise might be one way to address this issue.

5. Smart PLS Algorithm Model

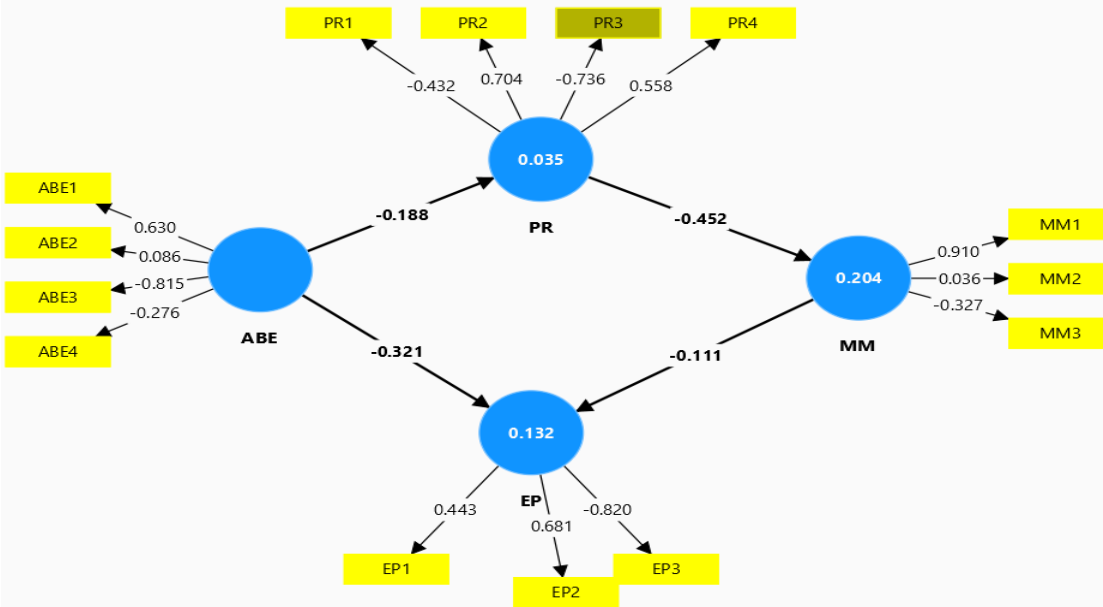

Figure 1: Smart PLS Algorithm Model:

The above results of figure 1 model represent that smart PLS Algorithm model in between ABE, PR, EP and MM according to the model ABE shows that 63%, 8%, 81% also that 27% positive and significant values between them. the PR shows that negative but its 43%,70%, 73% and 55% significant link between them.

6. Discussion

The purpose of this study was to evaluate the effects of aquatic exercise on patients with osteoarthritis in terms of pain, joint function, and quality of life by a systematic review of RCTs. Twelve studies that presented outcome variables, such as pain, quality of life, and joint dysfunction, in the form of means and standard deviations underwent qualitative meta-analyses after twenty studies were chosen based on particular inclusion and exclusion criteria. The 20 studies that were part of the study differed in terms of the treatments' techniques, duration of sessions, and program length. Therefore, it was challenging to assess their impact. Nonetheless, the water used for the aquatic activities was typically between 32 and 34 °C. Additionally, the majority of research combined aerobic exercises like walking, jogging, and weightlifting with weight training. The majority of studies used 12-week regimens with 50–60-minute sessions. Joint function, discomfort, and quality of life all improved

as a result of the therapies. Patients with osteoarthritis are known to benefit from aquatic exercise, balneotherapy (using mineral water), spa therapy (concentrating on water flow and temperature), and Kneipp hydrotherapy (using water pressure and temperature). These previous findings are supported by the current study's findings. To evaluate the impact of aquatic exercise on osteoarthritis patients' pain reduction, a meta-analysis was conducted. Self-report questionnaires and visual analogue scales were used to subjectively measure pain in the majority of the included studies. When compared to control groups that received no therapy, the meta-analysis revealed that pain was considerably lower in the aquatic exercise groups. Interestingly, the impact magnitude varied according to the patients' osteoarthritis location. Patients with hip and/or knee osteoarthritis saw a substantial reduction in pain; however, trials that included patients with any kind of osteoarthritis did not see a significant reduction in pain. According to these findings, exercising in the water may help reduce pain, particularly in people who have lower extremity osteoarthritis. Exercise that strengthens the muscles around the joints is likely to improve joint function and reduce discomfort. However, individuals with upper extremity osteoarthritis were the subject of just two of the research that made up the meta-analysis of this study. Therefore, more research is required to evaluate the causal link in this area. This study conducted a systematic review of the literature and meta-analyses of RCTs where patients with osteoarthritis received aquatic exercise-based therapies. This study is important because, in contrast to other research that confirmed the effects of these interventions separately, this study confirmed the effects of these interventions in a comprehensive and scientific way. Nevertheless, concerns of bias in respect to random sequence generation, allocation concealment, participant and staff blinding, and outcome assessment blinding were noted when the quality of the literature was assessed, even if the studies were RCT designed. Additionally, the meta-analysis only included a small number of studies that evaluated quality of life. As a result, more thorough methods and designs are needed in future research. Furthermore, the water exercise regimens' explanations were vague. Regarding the evidence basis used to determine the program lengths, weekly session counts, and session durations, no explanations were provided. Therefore, it is essential to employ more rigorous and sophisticated research methodologies to raise the level of current data in order to offer compelling evidence for the use of aquatic exercise as a nursing intervention. In nursing practice, it is believed that by employing it as an additional alternative therapy to reduce pain and function in patients with osteoarthritis, it would help to preserve health and improve quality of life.

7. Conclusions

Through the evaluation of RCTs, this study methodically examined how aquatic exercise affected osteoarthritis patients' pain, quality of life, and

functioning. Aquatic training has therefore been shown to improve quality of life, lessen dysfunction, and relieve pain in these people. Future research examining these impacts is required, though, as the ideal program length, frequency of sessions, and length of sessions for aquatic exercise have not yet been established. It is also necessary to look for ways to get around the time, money, and space constraints that come with exercising in the water. Lastly, a global database of prospectively registered systematic reviews having a health-related result is called PROSPERO. This study's drawback, though, is that it is not PROSPERO-registered. In conclusion, people with osteoarthritis can benefit from underwater exercise in terms of function, quality of life, and pain reduction. As a result, water treatment can be utilized in conjunction with non-pharmaceutical and non-surgical procedures such manual therapy, knee bracing, land-based exercise, and physical modalities.

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