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Original Article

The impact of spodetrig massage, exercise, and hypnotherapy on knee injury rehabilitation: A pathway to return to play

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Abstract:
Background: Knee injuries are common in sports that involve explosive movements, and inadequate treatment can result in long-term functional impairments. **Purpose:** This study aims to evaluate the effectiveness of *Spodetrig* massage, physical exercise, and hypnotherapy in the rehabilitation of knee injuries. **Methods:** A quasi-experimental design with a pretest-posttest control group was used. Participants were selected through purposive sampling based on specific criteria and provided informed consent to participate in all phases of the study. A total of 44 male participants were enrolled and divided into two groups: an intervention group (TG) and a control group (CG), with 22 participants in each. The CG did not receive any treatment, while the TG underwent a regimen of *Spodetrig* massage, physical exercise, and hypnotherapy. A descriptive analysis was performed to characterize the participants. The mean ± SD for age in the CG was 29.13±7.47 years, and in the TG was 30.95±9.70 years. For height, the CG averaged 170.09±6.99 cm, while the TG was slightly taller with 173.04±6.70 cm. The CG's weight was 72.18±4.26 kg, and the TG was 69.68±6.96 kg. The BMI of the CG was 25.03±2.12 kg/m², and the TG was 23.26±9.70 kg/m². The program lasted eight weeks, with two sessions per week. Psychological intervention (hypnotherapy) was given once a week. Data were collected before and after the treatment for the TG, while the CG underwent only initial and final testing. Various tools were used to measure pain levels, such as Range of Motion (ROM), Static Postural and Balance Control (SPBC), and knee function, Victorian Institute of Sport Assessment-Patella (VISA-P). **Results:** The results indicated that massage, exercise, and hypnotherapy treatment significantly reduced pain levels (0.00, $p < 0.05$; pain level in TG 2.45 ± 0.912; pain level in CG 4.73 ± 0.827), improved ROM (0.00, $p < 0.05$; ROM in TG 134.14 ± 5.130; ROM in CG 126.91 ± 5.715), enhanced SPCB (0.00, $p < 0.05$; SPCB in CG 49.05; SPCB in TG 36.64), and increased VISA-P scores (0.00, $p < 0.05$; VISA-P score in TG 74.68; VISA-P score in CG 55.27). The differences between the CG and TG were all statistically significant ($P < 0.05$). **Conclusions:** *Spodetrig* massage, exercise, and hypnotherapy effectively heal knee injuries, enabling individuals to return to their preferred sports activities.
Keywords: ***Spodetrig* massage, exercise therapy, hypnotherapy, knee injury, return to play**

Introduction

Sports injuries are prevalent in both training and competition settings, affecting athletes across various disciplines (Ristolainen et al., 2012). Researchers have investigated a range of injuries resulting from sports activities, encompassing both body-contact and non-body-contact sports (Cosendey et al., 2024; Feltz & Lirgg, 2001; Klügl et al., 2010; Priyonoadi et al., 2020; Sterne et al., 2019). Among the many injuries observed across different sports, knee injuries stand out due to their significant impact on mobility and long-term athletic performance. This injury affects the knee joint, an essential part of body movement. This part is vulnerable to various injuries, including fractures, ligament tears, and conditions such as osteoarthritis (Ageberg & Roos, 2015; Clayton & Court-Brown, 2008; Ndayisenga et al., 2021; Van Rossom et al., 2018). Symptoms of knee injuries typically include pain, swelling, limited range of motion, and joint stiffness (Kushartanti & Ambardini, 2020; Priyonoadi et al., 2020; Yuniana et al., 2022). one of the most common knee injuries is anterior knee pain, which often results from conditions like patellofemoral syndrome and jumper's knee (Larsson et al., 2012).

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Knee injuries are influenced by factors such as gender, age, and physical attributes, with males experiencing a higher incidence due to their tendency for more explosive movements (Clayton & Court-Brown, 2008). Other causes of knee injuries are overuse in sports activities that involve sudden changes in direction and strength training (Kongsgaard et al., 2009), concentric training (Cannell et al., 2001; Jonsson & Alfredson, 2005), the difference in types of eccentric training (Frohm et al., 2007; Young et al., 2005), and the lack of treatment after an injury occurs (Fredberg et al., 2008; Visnes et al., 2005). These injuries can occur during competitions, training sessions, and repetitive plyometric movements, such as high-speed jumping (Malliaras et al., 2013). These factors, such as chronic loading of the knee joint through explosive movements, can strain the patellar tendon to the patella, resulting in tendon degeneration and inflammation.

Generally, knee injuries can occur both acutely (less than seven days) and chronically. Athletes who experience knee issues will strive to recover quickly, using medical and non-medical approaches, in order to return to training or competition. Knee injuries are typically managed through rest, ice, immobilization, manual therapies such as massage, and specialized physiotherapy (Ndayisenga et al., 2021). However, in some severe cases, knee injuries require further treatment through surgical intervention. (Lian et al., 2005). Thus, the severity and location of the knee injury determine the types of treatment that should be administered.

Up to the present, various investigations have been conducted to study treatment approaches. For instance, a number of studies examined autologous blood injection, eccentric exercise, and anti-inflammatory therapies (Bell et al., 2013), high-volume injection and eccentric exercise (Boesen et al., 2017), anti-inflammatory treatment (Coombes et al., 2010), and eccentric exercise therapy (Everhart et al., 2017). Some studies also investigate the effects of transverse friction massage and cryotherapy with eccentric training on a decline board for chronic patellar tendinopathy. Additionally, other therapies have been applied in the recovery/rehabilitation of jumper's knee, such as 1) rest, 2) anti-inflammatory medications, 3) stretching and strengthening (stretching the hamstrings and quadriceps), 4) eccentric training programs, 5) extracorporeal shockwave (ECSW) therapy, 6) ultrasound-guided sclerosing, 7) open surgery, and 8) arthroscopic surgery. Furthermore, treatments like nonsteroidal anti-inflammatory drugs (NSAIDs), platelet-rich plasma injections, aprotinin, autologous growth factors, and other treatments have also been observed by Sterne et al. (2019) in their study.

As research continues to explore conventional treatments, alternative therapies like massage and acupuncture have also gained attention for their role in managing knee injuries. Scholars identified that knee injuries pathologically are closely related to inflammation. Thus, modalities like massage manipulation (Liza et al., 2023) are greatly needed to improve blood circulation (Rosser, 2004). Some of the most effective massage techniques for treating knee injuries include trigger point, friction, deep tissue massage, deep friction massage, and minimum skin pressure. Acupuncture and chiropractic manipulation are also examples of alternative approaches commonly used by therapists (Allen, 2016; Boguszewski et al., 2014; Fritz, 2013).

In addition to massage manipulation techniques, strength and flexibility exercises as physical therapy have been widely utilized and described as stimulants for gradual knee tissue healing post-injury. Scholars observed that they also enhance muscle-tendon strength and flexibility, improve knee function performance, and reduce the incidence of knee injuries (Belzer & Cannon, 1993; Coppack et al., 2011; Emery et al., 2005; Hwang, 2019; Kisner & Colby, 2007).

Besides the physical aspect described above, patients with knee injuries often experience psychological challenges post-injury and during rehabilitation. Therefore, psychological interventions play a crucial role in enhancing the rehabilitation process. Psychological interventions can be beneficial for both injury recovery/post-illness and sports performance. Indeed, previous scholars have studied the impact of mental training on elite sports performance (Cox, 2012; Ilham & Dimyati, 2021; Weinberg & Gould, 2012). However, research regarding psychological exercises for injuries is still limited. In fact, mental training during injuries is beneficial for reducing pain levels and even accelerating rehabilitation. During the rehabilitation period, a therapist should also recognize patients' mental/psychological readiness to return to sports, as some cases may also involve *kinesiophobia* (Slagers et al., 2021).

Based on the aforementioned issues, treatments for patients with knee injuries, both physical and psychological, can be combined to accelerate the recovery process. This series of programs includes three interventions: 1) massage therapy, 2) exercises, and 3) psychological therapy. Specifically, massage therapy comprises four types of massages: soft tissue massage, sports massage, deep tissue massage, and trigger point, which together form "*Spodetrig* massage." Meanwhile, exercise therapy interventions consist of four phases: maximum protection, moderate protection, minimum protection, and return to play. Lastly, psychological interventions involve scripts that have been developed and validated by hypnotherapy experts.

Despite the complexity of knee injuries, a comprehensive treatment plan that addresses both physical and psychological aspects can enhance recovery and prevent future injuries. The purpose of this research is to determine the effectiveness of *Spodetrig* massage, structured exercise programs, and psychological interventions that can be practically applied to treat mild to moderate knee injuries.

Material & methods

Research Design In order to investigate the effectiveness of the proposed interventions on knee injury recovery, a structured research design was implemented. In this research, a quasi-experimental design with a pretest-posttest control group was employed. The control group (CG) did not receive the treatment but was still assessed before and after the intervention. The treatment group (TG), on the other hand, received a program consisting of *Spodetrig* massage, exercises, and hypnotherapy. Data were collected through a pretest conducted before the treatment program and a posttest administered after completing the entire treatment.

Participant Participants were recruited using a purposive sampling technique with specific criteria and willingness to sign consent to participate in the entire program series. They were selected based on inclusion and exclusion criteria. The inclusion criteria for this study sample were: 1) male athletes or non-athletes, 2) having knee pain complaints, 3) experiencing knee joint balance problems, and 4) experiencing range of motion issues. Meanwhile, the exclusion criteria were: 1) patellar tendon previously operated on and reconstructed and 2) having arthritis or rheumatic joint diseases. A total of 44 male participants were included in this study and divided into two groups: the intervention group (N=22), which received the *Spodetrig* massage, exercise, and hypnotherapy treatment program (TG), and the control group (N=22). The mean ± SD age for the control group (CG) was 29.13±7.47 years and 30.95±9.70 years for the treatment group (TG). The mean height for CG was 170.09±6.99 cm, which was shorter than TG with 173.04±6.70 cm. Interestingly, the mean body weight for CG was heavier, with 72.18±4.26 kg, than TG, with 69.68±6.96 kg. The BMI of CG was 25.03±2.12 kg/m², while the TG was 23.26±9.70 kg/m². This study was further validated by obtaining ethical clearance, with the number 36.02/KEP/V/2024, from the Ethics Committee of Universitas Negeri Padang. The research was deemed ethically appropriate according to the seven WHO 2011 standards: 1) Social Value, 2) Scientific Value, 3) Fair Distribution of Burden and Benefit, 4) Risk, 5) Incentives/Exploitation, 6) Confidentiality and Privacy, and 7) Informed Consent, which refer to the CIOMS 2016 Guidelines. This is evidenced by the fulfillment of the indicators for each standard.

Procedure Before commencing the research, several preparatory steps were undertaken, including conducting preliminary research, obtaining ethical eligibility permits, securing research permits, and ensuring the availability of necessary research infrastructure such as sports medicine laboratories. Preparation also involved organizing research officers responsible for administering the massage, exercise, and hypnotherapy programs, distributing brochures for participant recruitment, screening potential participants based on inclusion criteria, and obtaining informed consent from participants. Participants were then randomized into two groups: the control group (CG) and the treatment group (TG). Measurements of pain level, range of motion (ROM), static postural and balance control (SPBC), and knee function assessments were conducted on both groups. The TG received the *Spodetrig* massage, exercise, and hypnotherapy program, while the CG did not receive any treatment.

After completing the program series for eight weeks, a posttest was conducted to assess the improvement and reduction of knee injury healing indicators experienced by the patients. These indicators involved pain level, ROM, static postural and balance control, and knee function. The massage therapy program is a combination of Sports Massage, Deep Tissue Massage, Trigger Point Massage, and Soft Tissue Massage (Best et al., 2008; Deetz & Petrie, 2022; Joseph et al., 2012; Kushartanti & Ambardini, 2020). In this research, each massage manipulation technique was designated as part of the massage therapy program. This combination series is called *"Spodetrig Massage"* and has its own allocation and emphasis, including the repetitions and estimated time for each massage manipulation provided. Meanwhile, the exercise therapy program adopted the Kisner exercise therapy menu (Kisner & Colby, 2007). However, it is developed in the form of 4 phases of exercise: maximum protection, moderate protection, minimum protection, and return to play. Meanwhile, for psychological exercise interventions, a hypnotherapy method was utilized alongside the *Spodetrig* massage and exercise. The combined treatment programs were provided for eight weeks with 2 sessions per week for the *Spodetrig* massage and exercise. Meanwhile, psychological interventions are provided once a week. Data in this study were collected from the TG before and after their treatments, while CG only underwent initial and final assessments.

Measurement/Instruments In order to comprehensively evaluate the effects of the treatment program, a variety of measurement tools were employed to assess pain, mobility, posture, balance, and knee function. The Visual Analog Scale (VAS) was used to assess the level of knee injury pain experienced, while the goniometer measured the Range of Motion (ROM). Static postural and balance control were evaluated using the Single Leg Stance (SLS) method, and knee function was measured using the Victorian Institute of Sport Assessment - Patella (VISA-P) questionnaire.

Statistical analysis The data obtained in this study were first subjected to normality testing using the Kolmogorov-Smirnov test. To ensure the equality of variances, homogeneity testing was performed using Levene's Test for Equality of Variances. Descriptive statistical analysis was conducted to delineate the characteristics of the data set. Subsequent statistical analyses included both paired t-tests and independent t-tests. The paired t-tests were employed to compare pre- and post-intervention measurements within groups, while independent t-tests were used to compare the control group (CG) and the treatment group (TG). Difference

testing was performed to assess variations in pain levels, range of motion (ROM), static balance, and knee function between the CG and TG. All statistical analyses were executed using SPSS software, version 25.

Results

Before testing the effectiveness of the interventions, prerequisite tests for normality and homogeneity were performed. Normality was assessed using the Kolmogorov-Smirnov analysis. The results indicated that all data were normally distributed, with p-values greater than 0.05 ($p > 0.05$) for all variables. To assess data homogeneity, the F-test (Levene's Test for Equality of Variances) was employed. The results revealed that all F-values were non-significant at the 5% significance level ($p > 0.05$), confirming no significant differences in variances between groups. The detailed results of these tests are presented in Tables 1 and 2.

Table 1. Summary of Normality Test Results

Variable Data Distribution		Kolmogorov-Smirnov Z	p-Value	Conclusion
Pretest	VAS	1.104	0.175	Normal
	ROM	0.870	0.435	Normal
	SLS	0.725	0.670	Normal
	VISA-P Score	1.051	0.220	Normal
Posttest	VAS	1.179	0.124	Normal
	ROM	1.087	0.188	Normal
	SLS	1.073	0.200	Normal
	VISA-P Score	1.263	0.082	Normal
Increase / Decrease	VAS	1.042	0.227	Normal
	ROM	0.793	0.556	Normal
	SLS	0.865	0.442	Normal
	VISA-P Score	0.888	0.410	Normal

Table 2. Summary of Variance Homogeneity Test Results Between Groups

Tested Data		Levene's Test for Equality of Variances *F*	*p* (Sig.)	Conclusion
Pretest	VAS	2.961	0.093	homogeneous
	ROM	0.343	0.561	homogeneous
	SLS	1.393	0.245	homogeneous
	VISA-P Score	3.428	0.071	homogeneous
Posttest	VAS	0.733	0.397	homogeneous
	ROM	1.375	0.248	homogeneous
	SLS	0.199	0.658	homogeneous
	VISA-P Score	0.391	0.535	homogeneous
Increase/	VAS	3.360	0.074	homogeneous
	ROM	2.223	0.143	homogeneous
	SLS	1.453	0.235	homogeneous
	VISA-P Score	0.416	0.522	homogeneous

The Effect of Spodetrig Massage, Exercise, and Hypnotherapy on Pain Levels

This section presents the findings related to the impact of the combined interventions of Spodetrig massage, exercise, and hypnotherapy on pain levels experienced by participants. The results of the analysis comparing pain level differences between the treatment group and the control group are presented in Table 3 and Figure 1.

Table 3. Test of Difference in Pain Levels between CG and TG

Group	Mean ± SD	t	Sig.(p-value)	Information
Initial VAS (Pretest)				
• TG	4.95 ± 1.397	0.624	0.536	Non-significant
• CG	4.73 ± 0.985			
VAS Final (Posttest)				
• TG	2.45 ± 0.912	-8.660	0.000*)	Significant
• CG	4.73 ± 0.827			
Decrease VAS				
• TG	2.50 ± 0.964	9.574	0.000*)	Significant
• CG	0.00 ± 0.756			

*Note: *) = Significant at the 5% significance level. This study used a significance level of 5% or 0.05, corresponding to a confidence level of 95%.*

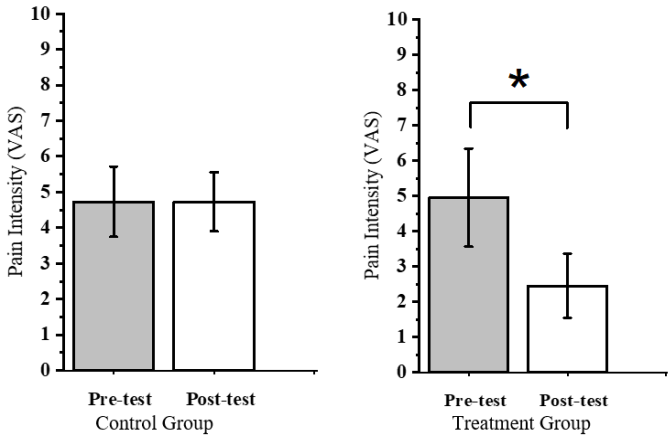

Fig 1. Comparison of pain levels between the control group (CG) and the treatment group (TG). TG, which received massage therapy, exercise, and psychological interventions, exhibited a significant reduction in pain levels (*p<0.05) compared to CG. Data are presented as means with standard errors. P-values were obtained using paired t-tests to compare pretest and posttest measures within each group.

Based on the summary table of the analysis results from the difference test between the control group (CG) and the treatment group (TG), the findings indicate that there was no significant difference in the initial pain level (before treatment) between CG and TG, indicated by t(42) =0.624, p>.05.

This demonstrates that both groups had balanced or insignificantly different Visual Analog Scale (VAS) measurements before receiving their respective treatments. In contrast, there was a significant difference in the final pain level (after treatment) between the groups, with t(42) =−8.660, p<.05. This indicates a significant difference in the final VAS measurements, with TG reporting a lower pain level (2.45 ± 0.912) compared to CG (4.73 ± 0.827), indicating a reduction in pain. Furthermore, a significant difference was found in the reduction of pain levels between CG and TG, as indicated by t(42)=9.574, p<.05. This demonstrates that the TG experienced a greater reduction in pain levels, with mean reductions of 2.50 ± 0.964 for TG compared to 0.00 ± 0.756 for CG.

The effectiveness of the program in reducing pain levels can be calculated as follows:

(1) Reduction in pain level in TG (%) $= \left(\frac{4.95-2.45}{4.95}\right) x\,100\% = 0.5050\; x\;100\% = 50.50\,\%$

Meanwhile, the reduction in pain level in the control group is denoted:

(2) Reduction in pain level in CG (%) $= \left(\frac{4.73-4.73}{4.73}\right) x\,100\% = 0.000\; x\;100\% = 0.00\,\%$

Based on these calculations, it was evident that the program was highly effective, with a 50.5% reduction. Meanwhile, in the control group, the pain reduction was 0.0%. These results indicate that the program is effective in reducing pain levels. The next analysis was about the difference in ROM between CG and TG. The results are presented in Table 4 and Figure 2.

Table 4. Test of Difference in ROM between CG and TG

Group	Mean ± SD	t	Sig. (p-value)	Information
Initial ROM (Pretest)				
• TG	125.05 ± 6.336	-0.329	0.744	Non-significant
• CG	125.68 ± 6.484			
Final ROM (Posttest)				
• TG	134.14 ± 5.130	4.414	0.000*)	Significant
• CG	126.91 ± 5.715			
Increase in ROM				
• TG	9.09 ± 3.504	8.310	0.000*)	Significant
• CG	1.23 ± 2.724			

*Note: *) = Significant at the 5% significance level. This study employed a significance level of 5% or 0.05, corresponding to a confidence level (95%).*

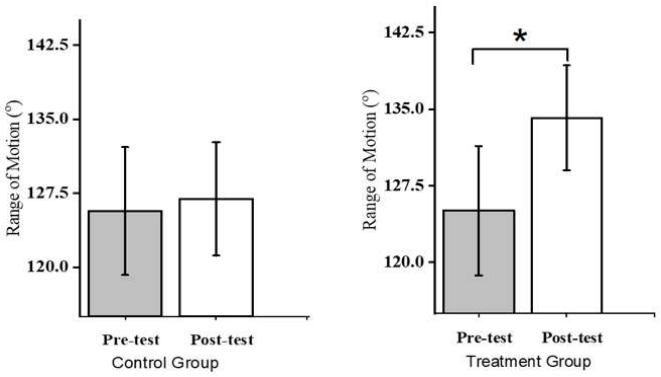

Fig 2. Comparison of range of motion (ROM, in degrees) between the control group (CG) and the treatment group (TG). TG, which received a combined intervention, showed a significant increase in ROM (*p<0.05) compared to CG. Data are presented as means with standard errors. P-values were obtained using paired t-tests to compare pretest and posttest measures within each group.

Based on the summary table of the analysis results from the difference test between the groups, the findings indicate that there was no significant difference in the initial range of motion (ROM) before treatment between the control group (CG) and the treatment group (TG), as evidenced by t (42) =−0.329, p>.05. This demonstrates that both groups had balanced or insignificantly different ROM before receiving different treatments. In contrast, a significant difference was observed in the final ROM after treatment between CG and TG, indicated by t (42) =4.414, p<.05. This indicates a significant difference in final ROM between CG and TG. The TG had a greater ROM than the CG, with mean ROM values of 134.14 ± 5.13 for TG and 126.91 ± 5.72 for CG. A greater ROM indicates a better outcome. Furthermore, there was a significant difference in the increase in ROM between CG and TG, as indicated by t (42)=8.310, p<.05. This indicates that TG experienced a higher increase in ROM compared to CG, with means of 9.09 ± 3.50 for TG and 1.23 ± 2.72 for CG, reflecting a better overall outcome.

The effectiveness of the program in increasing ROM can be calculated as follows:

(3) Increase in ROM (%) = $= \left(\frac{134.14-125.05}{125.05}\right) x\ 100\% = 0.0727\ x\ 100\% = 7.27\ \%$

Meanwhile, the increase in ROM in the control group is calculated as follows:

(4) Increase in ROM (%) = $= \left(\frac{126.91-125.68}{125.68}\right) x\ 100\% = 0.0098\ x\ 100\% = 0.98\ \%$

These calculations indicate that the program was highly effective in increasing ROM in the TG, with an effectiveness of 7.27%, compared to 0.98% in the CG.

The next results showed the difference in static postural and balance control, as illustrated in Table 5 and Figure 3.

Table 5. Test of Difference in SPBC between CG and TG.

Group	Mean ± SD	t	Sig. (p-value)	Information
Initial SPBC Awal (Pretest)				
• TG	35.77 ± 6.838	-0.287	0.775	Non-Significant
• CG	36.32 ± 5.702			
Final SPBC (Posttest)				
• TG	49.05 ± 5.593	8.239	0.000*)	Significant
• CG	36.64 ± 4.315			
Increase SPBC				
• TG	13.27 ± 6.606	7.245	0.000*)	Significant
• CG	0.32 ± 5.168			

*Description: *) = Significant at the 5% significance level. In this study, a significance level of 5% or 0.05 was used, corresponding to a confidence level (95% Confidence Level). SPBC: static postural and balance control*

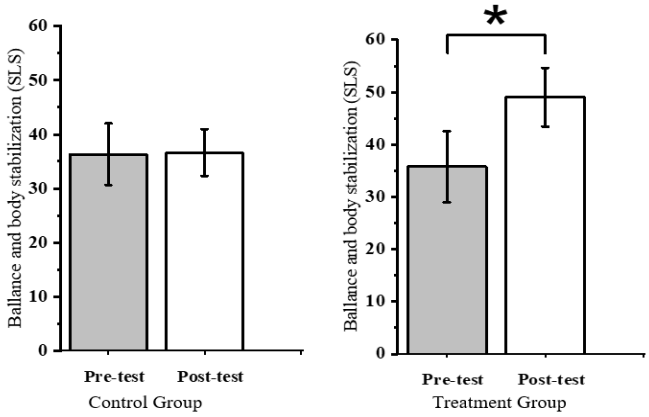

Figure 3 shows the difference in SPBC (measured in seconds) Between TG and CG Groups. The group given massage therapy, exercise, and psychological intervention can significantly improve body balance and stability (*p<0.05) compared to the control group.

Based on the summary table of the SPBC difference test analysis results between the groups, the findings revealed that there was no significant difference in the initial SPBC scores (before treatment) between the control group (CG) and the treatment group (TG), as indicated by t (42) =−0.287, p>.05. This demonstrates that both groups had balanced or insignificantly different SPBC scores before receiving different treatments. Conversely, a significant difference was observed in the final SPBC scores (after treatment) between CG and TG, with t (42) =8.239, p<.05. This confirms a significant difference in final SPBC, with the treatment group (TG) achieving a greater SPBC compared to the control group (CG), with mean SPBC values of 49.05 for CG and 36.64 for TG, indicating a better overall outcome. Furthermore, there was a significant difference in the increase in SPBC between CG and TG, indicated by t (42) =7.245, p<.05. This finding highlights that the TG experienced a higher increase in SPBC compared to CG, with means of 13.27 ± 6.61 for TG and 0.32 ± 5.17 for CG, reflecting a better overall outcome.

The effectiveness of the program in increasing SPBC can be calculated as follows:

(5) Increase in SPBC (%) = $= \left(\frac{49.05-35.77}{35.77}\right) x\ 100\% = 0.3713\ x\ 100\% = 37.13\%$

Meanwhile, the decrease in SPBC in the control group is mathematically counted as follows:

(6) Decrease in SPBC (%) = $= \left(\frac{26.64-26.32}{26.32}\right) x\ 100\% = 0.0088\ x\ 100\% = 0.88\%$

These effectiveness calculations indicate that the *Spodetrig* massage program has a high effectiveness of 37.13%, while in the control group, it is 0.88%. These results suggest that the program is effective in increasing SPBC.

Finally, Table 6 and Figure 4 provide the results of the analysis of the difference in VISA-P Score between CG and TG.

Table 6. Test of difference in VISA-P score between CG and TG

Group	Mean ± SD	t_{count}	Sig. (p-value)	Information
Initial VISA-P Score (Pre-Test)				
• TG	51.14 ± 4.507	-0.690	0.494	Non-significant
• CG	52.00 ± 3.767			
Final VISA-P Score (Post-Test)				
• TG	74.68 ± 3.810	17.306	0.000*)	Signficant
• CG	55.27 ± 3.628			
Increase VISA-P Score				
• TG	23.55 ± 5.352	13.526	0.000*)	Significant
• CG	3.27 ± 4.558			

*Note: *) = Significant at the 5% significance level. In this study, a significance level of 5% or 0.05 was used, corresponding to a confidence level (95% Confidence Level).*

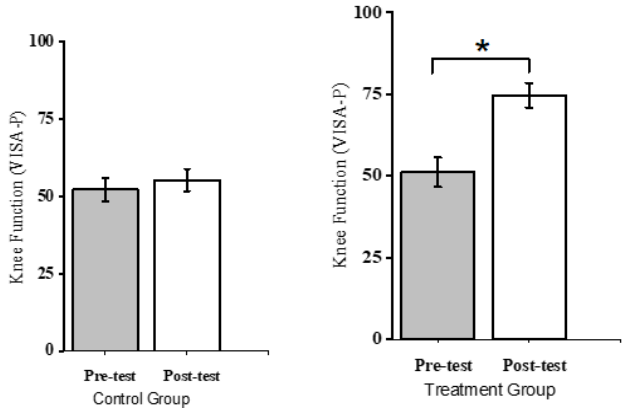

Fig 3. Test of difference in VISA-P scores between the control group (CG) and the treatment group (TG). The group receiving combined interventions showed a significant improvement in knee function compared to the control group (*p < .05).

Based on the summary table of the analysis results from the difference test between the groups, the findings reveal that there was no significant difference in the initial VISA-P score (before treatment) between the control group (CG) and the treatment group (TG), as indicated by t(42) =−0.690, p>.05. This demonstrates that both groups had balanced or insignificantly different VISA-P scores prior to receiving different treatments. However, a significant difference was found in the final VISA-P score (after treatment) between CG and TG, with t(42) =17.306, p<.05 This indicates that the TC achieved a greater VISA-P score of 74.68 compared to 55.27 for CG, indicating a better treatment outcome. Additionally, there was a significant difference in the increase in VISA-P score between CG and TG, indicated by t (42) =13.526, p<.05. This suggests that the increase in VISA-P score was higher in the TG compared to the CG, with mean increases of 23.55 for TG and 3.27 for CG. A greater VISA-P score indicates a better outcome.

The effectiveness of the program in increasing the VISA-P score in TG can be calculated as follows:

(7) Increase in VISA-P Score (%) = $= \left(\frac{74.68-51.14}{51.14}\right) x\ 100\% = 0.4603\ x\ 100\% = 46.03\%$

Meanwhile, the increase in VISA-P score in CG can be calculated as follows:

(8) Increase in VISA-P Score (%) = $= \left(\frac{55.27-52.00}{52.00}\right) x\ 100\% = 0.0629\ x\ 100\% = 6.29\ \%$

The effectiveness calculations reveal that the *Spodetrig* massage, exercise, and hypnotherapy program has a high effectiveness rate of 46.03%, compared to 6.29% in the control group. These results indicate that the program significantly improves the VISA-P Score.

Discussion

A key focus of this study is the effectiveness of a comprehensive therapy program for knee joint treatment. This program includes *Spodetrig* massage, physical exercise therapy with appropriate phases and dosages tailored to individual needs, and psychological intervention through hypnotherapy. These combined therapies have been shown to be effective. Additionally, a novel aspect of this research is the full-package program, which ensures that patients can return to their usual sports activities (return to play) after treatment. The massage therapy regimen involved several combinations of massage techniques, including sports massage, deep tissue massage, trigger point therapy, and soft tissue massage. For the exercise program, various types of muscle contractions were incorporated, such as eccentric, concentric, and isometric contractions. The exercise therapy intervention consisted of four phases: maximum protection, moderate protection, minimum protection, and return to play. The psychological intervention involved scripts that were prepared and validated by hypnotherapy experts to help patients manage the psychological aspects related to their injuries.

This study reports the effectiveness of the program using an experimental study involving a control group. The program was proven effective with indicators such as pain reduction, improved static postural and balance control, increased knee function, and ROM. This evidence aligns with several previous studies (Kushartanti & Ambardini, 2020) on knee injury treatment, whether through partial programs or combination, that prove the effectiveness of deep tissue massage in healing ankle injuries. This study also confirms previous research stating that massage therapy is identified as an effective complementary therapy in treating patellofemoral pain syndrome (Zalta, 2008).

Additionally, it is also reported that deep tissue massage has a positive influence on reducing pain in ankle injuries, while soft tissue massage has an impact on the healing of ankle function. (Kushartanti & Ambardini, 2020). Research on deep friction massage and the minimum skin pressure is required to promote

deformation of the patellar tendon. The research reported that the average pressure required to induce macroscopic deformation of the patellar tendon is 1.12 ± 0.37 kg/cm2, which is not influenced by patient characteristics (Chaves et al., 2018). This emphasizes that both deep friction and deep tissue massage are important to stimulate tendon healing in knee joints. Thus, the complexity of massage therapy's function is confirmed in our research and previous studies, which can address various indicators of recovery in patients experiencing injuries.

From the perspective of exercises to improve knee injury healing, the effectiveness of progressive tendon loading exercises in patellar tendinopathy knee injury conditions has been proven. These exercises serve as therapeutic exercises for knee injury healing, as evidenced by the measured knee function (VISA-P), which showed significant differences from that of the control group (Breda et al., 2020). However, the limitations of this study are confined to specific segments. Hence, many exercises can be combined to enhance the strength of muscles and joints that have experienced injury, as well as the joints throughout the body as a whole. The response of static and dynamic balance in patients with knee joint injuries has shown a positive response in improving knee function (Fernandes et al., 2016; Kisner & Colby, 2007; Takacs et al., 2017; Wegener et al., 1997).

Previous research has also demonstrated that massage therapy followed by exercise therapy can effectively improve function in hip injuries, as there is an enhancement in pelvic muscle function recovery, increased range of motion in the hip joint, and reduction in hip pain (Yuniana et al., 2022). This confirms the research we conducted on knee injuries but with the addition of psychological intervention.

Regarding psychological intervention, a systematic review evaluating 11 studies involving 982 athletes and 15 psychological factors revealed three central elements of self-determination theory: motivation, confidence, and low fear. They were found to correlate with a greater likelihood of returning to the pre-injury level of participation and returning to sport more quickly (Ardern et al., 2013). According to earlier research, hypnosis was reported as a method to reduce anxiety during perioperative phases and is also useful for postoperative pain management (Fathi et al., 2019).

Although this study has demonstrated the effectiveness of the program, it still has several limitations that need to be considered for the sustainability of research and its practical application. For example, patients had a limited time to participate in the study at the clinic, which was one of the main constraints. To address this issue, schedule adjustments were made, and in some cases, researchers had to visit patients to ensure the smooth running of the program. Second, it had a limited sample size.

To improve the validity of the results, re-generalization needs to be done with a larger sample size to strengthen the research findings. This study was also limited in manpower, especially those capable of administering treatment to patients. This limitation affected treatment hours. In addition, the treatments were conducted by researchers on average, which could affect the consistency and final outcomes of the program. In addition, it had a lack of insight into influencing factors: The lack of understanding of exogenous and endogenous factors could affect outcomes during the healing process in this study. Fifth, complex injury pathologies and previous injury histories can have a significant impact on the recovery process. Each subject may have specific knee injuries, such as patellar tendinopathy, ACL, LCL, MCL, bursitis, meniscus, and other types of injuries, requiring a more specific approach.

Finally, this study had a lack of radiological monitoring. Limitations in monitoring the type of injury and the healing level using radiological systems before and after treatment can be a barrier to evaluating the effectiveness of the program more deeply. Thus, integrating radiological monitoring can provide a more comprehensive picture of patient progress and treatment outcomes.

Nevertheless, this research still offers a holistic and integrated approach to massage, physical exercise, and psychological intervention, offering a comprehensive and effective method for accelerating the recovery process of patients with knee injuries. Hopefully, these findings can serve as a foundation for further developments in knee injury rehabilitation and provide significant future benefits for practitioners and patients.

Conclusions

In conclusion, this study demonstrates that the program of *Spodetrig* massage, exercise, and hypnotherapy significantly decreases VAS ($p < 0.05$), ROM ($p < 0.05$), SLS ($p < 0.05$), and VISA-P ($p < 0.05$) scores. The comparison between the control group and the treatment group revealed significant differences ($p < 0.05$). The *Spodetrig* massage, exercise, and hypnotherapy program is effective in improving recovery indicators in patients with knee joint injuries. Researchers can use these results to enrich research references related to sports rehabilitation therapy, especially for mild to moderate subacute knee injuries. Additionally, therapists and instructors can reference these findings to develop and apply programs for individuals with knee injury problems.

Conflicts of interest - There is no conflict of interest to declare.

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