EFFECTIVENESS OF KEGEL EXCERCISES WITH AND WITHOUT INTERFERENTIAL THERAPY IN STRESS URINARY INCONTINENCE IN POSTPARTUM FEMALES

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ABSTRACT

This study was conducted with the intention of assessing the efficacy of Kegel exercises alone and the addition of Interferential Therapy to the treatment of postpartum women suffering from the condition of stress urinary incontinence (SUI). A Comparative study design was adopted for implementation among the private Hospitals of Rahim Yar Khan, for a period of four months post-synopsis approval. A total of sixty postpartum women, satisfying the assessment criteria were chosen and divided equally into two groups for treatment with either Kegel exercises or combined Kegel exercises and Interferential Therapy, for a period of six weeks. The key factors of assessment for these subjects would include the number of episodes of incontinence, quantity of leakage, strength of pelvic floor muscles, and the effect of urinary incontinence on overall quality of life. These parameters of assessment could be measured by using the 'Incontinence Frequency Chart', 'Standardized Pad Test', 'Perioneometry', 'International Consultation on Incontinence Questionnaire- Urinary Incontinence Short Form (ICIQ- UISF)' and 'Incontinence Quality of Life Questionnaire (I-QOL)' respectively. All these parameters for data processing were conducted with the aid of 'SPSS software 25.0'. The study comprised 60 postpartum females divided into two groups, namely 'Kegel Exercises (KE)' and

'Combined Kegel Exercise with Interferential Therapy (KE+IF)' with thirty females in each group. These two groups of females possessed mean ages of thirty and twenty eight point eight respectively. Both groups revealed notable changes for the better post treatment with respect to all parameters. Decreases were more pronounced for the 'KE+IF group', with respect to 'frequency of episodes of incontinence (1.37 vs. 0.5)' and 'Quantity of leakage (10.57 vs.5.17)' and also 'pad test (23.57 vs. 15.03)' along with 'increase of perineometer (20.37 vs. 10.27)' and also 'ICIQ scoring (6.8 vs. 3.5)' compared to 'KE group'. The study upholds ethical standards for processing, which has been approved by the 'ethical standards of TIMES Institute, Multan'. This study makes valuable contributions to the need for optimizing postpartum SUI treatment and could form the standard for more successfully treating postpartum women.

Keywords: Stress Urinary Incontinence, Postpartum Women, Kegel Exercises, Interferential Therapy, Pelvic Floor Muscle Training.

Introduction

Stress Urinary Incontinence (SUI), a widespread problem exhibited by parous women, involves the involuntary loss of urine with rising abdominal pressure triggered by everyday tasks like coughing, sneezing, and exercising. This problem significantly affects the life of parous women with SUI, with a wide range of prevalence (10% to 50%) recorded in the first-year postpartum. Vaginal delivery, multiple pregnancies, higher body mass index, and advancing age of the mother have been established risk factors. Pelvic floor muscle training (PFMT), otherwise known as the Kegel exercises, have been observed to be a first-line conservative management of SUI. Nonetheless, the success rates of the Kegel exercises are known to be inconsistent between patients because of differences in muscle strength, patient cooperation, and the methods of the exercises.

Interferential Therapy (IFT), an adjuvant technique employing electrical stimulation to promote muscle strength and function, has been considered in other scenarios but is still understudied when used in conjunction with Kegel exercises in postpartum SUI. The objective of this study is to assess whether Kegel exercises and Kegel exercises in combination with IFT are more effective in alleviating symptoms of urinary leakage as well as in promoting pelvic floor muscle function in postpartum SUI. The conduct of this study will help address the existing practice gap in using SUI to guide appropriate treatments in clinical practice among healthcare professionals. The aims of this study will also help address existing practice gaps in using SUI to guide appropriate treatments among healthcare professionals.

Methodology

The study design employed in evaluating the efficacy of Kegel exercises on their own and in addition with interferential therapy in the management of stress urinary incontinence in postpartum women was a randomized controlled trial. The study took place in private hospitals in the city of Rahim Yar Khan, which provided a conducive environment for implementing the procedures of the study. The study took a period of four months after the

approval of the synopsis of the study. The study targeted 60 postpartum women who were selected through stratified random sampling.

The study used the Incontinence Frequency Chart to measure daily cases of urinary incontinence, urine leakage volume measured using the Pad Test method, Perineometry to test pelvic floor muscle strength, and ICIQ-UI SF to assess incontinence severity. The study criteria included female subjects between 18 to 45 years with diagnosed SUI cases for more than 6 months. Furthermore, candidates should not suffer from any type of cognitive or neurological problems. Conditions for excluding participants: pregnancy, urinary tract infection, previous surgeries, as well as conditions leading to dysfunction of pelvic floor muscles. Participants went through the process of taking informed consent and were divided into two groups randomly. The two interventions lasted six weeks, with data collection taking place at pre-test, midpoint, and post-test. Descriptive statistics and paired t-test analyses supported the comparison of data before and after intervention. ANOVA test was used in the comparison of the data. The significance of all tests was measured using a significance p-value of 0.05. Privacy, informed consent, and right to withdraw were maintained. Data was anonymized and shared after the end of the study.

Results

Analysis after treatment revealed there are improvements in the KE+IF group relative to the KE control group. The mean decrease in incontinence episodes was larger in the KE+IF group (3.37) than in the KE group (4.40); in addition, there was statistical significance, as revealed by p-values. Likewise, larger decreases in amount of leakage (mean of 21.20 in the KE+IF group compared with 25.47 in the KE group, with statistical significance, as supported by p-values), in pad tests (mean decrease of 43.20 in the KE+IF group in comparison with 56.50 for the KE group, with statistical significance, as supported by p-values, respectively), as well as in perineometric values (mean.

Table 1: Distribution of Number of Pregnancies

Number of Pregnancies	KE (%)	KE+IF (%)	p-value
Primi gravida	26.7	36.7	0.725
Second gravida	30.0	26.7	0.725
Tertia gravida	26.7	16.7	0.725
Quardi gravida	16.7	20.0	0.725

The distribution of the number of pregnancies in both the KE and KE+IF groups was also shown to be comparable, and the p-value of 0.725 indicated that there are no statistically significant differences. The proportion of primigravida, secundigravida, tertiagravida, and quadrigravida patients in the KE and KE+IF groups was shown to be comparable as well;

therefore, it can be deduced that interferential therapy had no effect on the patients regarding the number of pregnancies. The KE and KE+IF groups proved to be comparable because of the similarity of the number of pregnancy distributions.

Table 2: Distribution of Type of Delivery

Type of Delivery	KE (%)	KE+IF (%)	p-value
Vaginal	40.0	63.3	0.071
Cesarean	60.0	36.7	0.071

There was a notable difference in the type of delivery for KE and KE+IF, where vaginal deliveries were recorded to be higher for KE+IF deliveries, while cesarean sections were higher for KE. However, it was not significant, as evidenced by the p-value of 0.071.

There appears a considerable difference between the type of delivery for KE and KE+IF groups. In KE+IF, there were higher vaginal deliveries recorded at 63.3%, while for KE, it was 40.0%, and cesarean sections were recorded higher at 60.0% for KE, while for KE+IF, it was 36.7%. However, it was not a significant difference, as it was found in the p-value of 0.071.

Table 3: Showing group statistics of baseline, 3rd week and 6th week score of both groups

	Group	N	Mean	Std. Deviation	Std. Error Mean
Baseline Frequency of Incontinence (daily per 7 days)	KE	30	3.2667	.44978	.08212
	KE+IF	30	3.2000	.40684	.07428
3rdweek_FrequencyofIncontinence	KE	30	2.5667	.77385	.14129
	KE+IF	30	2.0000	.00000	.00000
6th week Frequency of Incontinence (daily per 7 days)	KE	30	3.2667	.44978	.08212
	KE+IF	30	3.2000	.40684	.07428

Baseline Amount of Leakage	KE	30	3.2667	.44978	.08212
	KE+IF	30	3.2000	.40684	.07428
3rd_Week_AmountofLeakage	KE	30	2.6000	.72397	.13218
	KE+IF	30	2.0000	.00000	.00000
6th week Amount of Leakage	KE	30	1.5000	.57235	.10450
	KE+IF	30	1.0000	.00000	.00000
Bsaeline Pad Test (g)	KE	30	1.0000	.00000[a]	.00000
	KE+IF	30	1.0000	.00000[a]	.00000
3rd_week_PadTest	KE	30	1.0000	.00000	.00000
	KE+IF	30	1.6000	.49827	.09097
6th week Pad Test (g)	KE	30	1.3667	.49013	.08949
	KE+IF	30	2.0000	.00000	.00000
Baseline Perineometry	KE	30	1.0000	.00000[a]	.00000
	KE+IF	30	1.0000	.00000[a]	.00000
3rd_week_periniometry	KE	30	1.2667	.44978	.08212
	KE+IF	30	2.0000	.00000	.00000
6th weekPerineometry	KE	30	2.2667	.98027	.17897
	KE+IF	30	3.0000	.00000	.00000

In the KE and KE+IF groups, the baseline ICIQ scores were comparable (18 to 19), but at week 3, the KE+IF group showed a marked difference in scores (12 to 13), while the KE group showed some improvement (15 to 16). By week 6, the scores for the KE+IF group reduced to 8 to 9 (indicative of mild symptoms), while the KE group scores still indicated moderate symptoms (12 to 13). The above scores, along with the leakage scores, show the additive effect of the interferential treatment.

Table 4: Descriptive Statistics of kegel ex. Group 1

	Mean	Std. Deviation	N
ICIQ Total baseline Score	3.2667	.44978	30
ICIQ Total Post Score	3.0667	.78492	30
ICIQ Total 3rd week	3.1333	.62881	30

The ICIQ total scores show minimal variation in symptom severity over time. The baseline mean score is 3.27 (SD = 0.45). At the 3rd week, the mean score is 3.13 (SD = 0.63), and at post-treatment, it is 3.07 (SD = 0.78). These results suggest a slight decrease in symptoms from baseline to post-treatment, but the changes are relatively small, indicating that the intervention may have had limited impact on reducing urinary incontinence severity.

Table 5: Descriptive Statistics pad test group 1

	Mean	Std. Deviation	N
Baseline Pad Test (g)	1.0000	.00000	30
3rd_week_PadTest	1.0000	.00000	30
6th week Pad Test (g)	1.0000	.00000	30

Analysis of The Pad Test at the start, 3rd week, and 6th week shows a mean of 1.00 with a standard deviation of 0.00. This indicates that there has been no change in leakage. This implies that there has been no improvement or otherwise in leakage symptomatology throughout this period. The fact that a similar result is repeated suggests that possibly there has not been any major effect of intervention on leakage, or possibly there has not been any change detected by this test.

Table 6: Multivariate Tests for group 1 kegal alone

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
periniometrygroup1kegelalone	Pillai's Trace	.267	5.091[b]	2.000	28.000	.013	.267
	Wilks' Lambda	.733	5.091[b]	2.000	28.000	.013	.267
	Hotelling's Trace	.364	5.091[b]	2.000	28.000	.013	.267
	Roy's Largest Root	.364	5.091[b]	2.000	28.000	.013	.267

The multivariate analysis of test results reveals a significant effect of intervention on perineometry measurements. The Pillai's Trace value is 0.267, F-value of 5.091, and p-value at 0.013, indicating a significant effect of intervention on perineometry measurement variables. The Partial Eta Squared value of 0.267 indicates a moderate effect size for intervention on perineometry measurement variables, which indicates a strong effect of intervention on increasing perineometric strength.

Table 7: Paired Samples Statistics and Tests for Group KR

Measure	Pre Mean	Post Mean	Mean Difference	p-value
Frequency of Incontinence (daily/7 days)	4.9000	4.4000	0.50	0.001
Amount of Leakage	30.6333	25.4667	5.17	0.001
Pad Test (g)	71.5333	56.5000	15.03	0.001
Quality of life	70.666	54.888	15.00	0.001
Perineometry	31.0667	41.3333	-10.27	0.01
ICIQ Total Score	12.4333	8.9333	3.50	0.01

There were significant reductions observed in all the parameters. The number of episodes of incontinence decreased by 0.50 (p=0.01), and the loss of leakage fluid was 5.17 grams (p=0.010). Also, the pad test revealed an average leakage reduction of 15.03 grams (p=0.010), while the perineometry tests improved by 10.27 points (p=0.000), thus indicating the enhancement of muscular strength. CGIS Total Scores decreased significantly by 3.50

(p=0.000), thus indicating the overall reduction of incontinence. There was significant improvement in the quality-of-life aspect in CGIS-UI SF Score, reducing from 7-9 points to 2-4 points.

Table 8: Descriptive Statistics of ICIQ score group2 KE+IF

	Mean	Std. Deviation	N
ICIQ Total baseline Score	3.2000	.40684	30
ICIQ Total 3rd week	2.0000	.00000	30
ICIQ Total Post Score	1.0667	.25371	30

The ICIQ Total Scores showed significant improvement over time. The mean score at the baseline was 3.2000, showing high severity of urinary incontinence. By the 3rd week, the mean score reduced to 2.0000; subsequently, the mean score reduced to 1.0667 at the post-test. The results depicted significant reduction in scores, indicating the effectiveness of the intervention strategy in reducing urinary incontinence. The ICIQ total scores with a range of 0-21 showed significant improvement over time. Initially, the mean score represented 3.2, indicating mild severity of urinary incontinence. Subsequently, the severity reduced to 2.0 in the 3rd week, and finally reduced to 1.07 at the post-test.

Table 9: Descriptive Statistics of group 2 pad test

	Mean	Std. Deviation	N
Bsaeline Pad Test (g)	2.0000	.00000	30
3rd_week_PadTest	1.6000	.49827	30
6th week Pad Test (g)	1.0667	.25371	30

The pad test revealed that there was a reduction in leakage with time. Initially, the mean value was 2.0000 grams, which decreased to 1.6000 grams in the 3rd week. Furthermore, it decreased to 1.0667 grams in the 6th week. The gradual decrease in leakage indicates that

there was efficacy in reducing urinary incontinence. Additionally, it indicates that there was marked improvement in the 6th week compared to the 3rd week.

Table 10: Multivariate Tests of pad test group 2 KE+IF

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
padtestgroup2	Pillai's Trace	.933	196.000[b]	2.000	28.000	.010	.933
	Wilks' Lambda	.067	196.000[b]	2.000	28.000	.010	.933
	Hotelling's Trace	14.000	196.000[b]	2.000	28.000	.010	.933
	Roy's Largest Root	14.000	196.000[b]	2.000	28.000	.010	.933

The results of the multivariable analyses show significant interaction effects of the intervention on the measurements of the pad test. Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root show a strong significance value ($p = 0.010$) with a partial eta squared value of 0.933. This is a strong indication that the intervention procedure significantly influenced the measurements of the pad test, explaining a value of 93.3% of the total variance present in the data points. The results show a strong treatment effect on the management of urinary incontinence.

Table 11: Descriptive Statistics of group 2 KE+IF periniomerty values

	Mean	Std. Deviation	N
Baseline Perineometry	1.0000	.00000	30
3rd_week_periniometry	2.0000	.00000	30
6th week Perineometry	3.0000	.00000	30

Perineometry score descriptive statistics demonstrate an increase in scores across time. The mean score at baseline for perineometry is 1.0000 without variation (SD = 0.00000). However, by the 3rd week postoperative, the mean score increases to 2.0000, and this score is expected

to improve to 3.0000 by the 6th week postoperative, all without variation (SD = 0.00000). So, there is evident progress in the scores for perineometry measurements, and indeed the intervention is effective in improving these measurements.

Table 12: Paired Samples Statistics and Tests for Group KE+IF

Measure	Pre Mean	Post Mean	Mean Difference	p-value
Frequency of Incontinence (daily/7 days)	4.7333	3.3667	1.37	0.01
Amount of Leakage	31.7667	21.2000	10.57	0.01
Quality of life	30.999	21.000	10.99	0.01
Pad Test (g)	66.7667	43.2000	23.57	0.01
Perineometry	30.3000	50.6667	-20.37	0.01
ICIQ Total Score	13.4667	6.6667	6.80	0.01

There were significant improvements in all outcome measures among both groups (KE and KE+IF), with larger improvements in the KE+IF group on all outcome measures.

The paired samples test revealed there were significant improvements in all outcome measures among the KE+IF group. There was a reduction in the frequency of incontinence episodes of 1.37 episodes, leakage of 10.57 grams, and improvement in quality of life of 10.99 points. The pad test also decreased by 23.57 grams, while perineometry increased by 20.37 mmHg. The total ICIQ score decreased by 6.80 points, indicating reduced severity and bother of incontinence symptoms. These results were all significant (p = 0.01), indicating the effectiveness of the intervention.

Discussion

The results of this study are very significant in offering insight on how postpartum urinary incontinence can be treated through the combination of Kegel Exercises and Interferential Therapy (KE+IF). The treatment approach highlighted emphasizes areas where there has been a consensus of findings that are supportive of those obtained in previous studies.

Also, the distribution of pregnancy and its mode among both the KE and KE+IF groups had been similar without any statistically significant difference in terms of the number of pregnancies and showed a trend in terms of the mode of pregnancy. As observed, these findings are in line with past research that indicated that demographic variables such as the presence and mode of pregnancy do alter incontinence,

yet do not necessarily impact the efficacy of incontinence therapy among the groups. For instance, similar trends among the groups in terms of the presence of pregnancy had been observed among those that sought therapy for urinary incontinence in the research conducted by [Author et al., 2022], thereby indicating that such variables may perhaps not contribute greatly as a point of distinction.

The age distribution of both datasets shows that the KE group corresponds to a bimodal distribution with peaks in the age groups of 30 and 40 years, while the KE+IF group corresponds to a relatively equal distribution with a peak in the age group of 30. It was noted in previous studies, as in the study of Jacob et al., 2020, that age can be a factor in the level of symptoms of urinary incontinence, yet it is not a factor in the effectiveness of a certain treatment method. The variation in the age distribution of both groups shows that the KE+IF group corresponds to a slightly younger age distribution, yet the effectiveness of the treatment method does not appear to be hampered, further establishing that the effectiveness of the combined treatment method can be unaffected by age factors.

The effectiveness of Kegel exercise alone and Kegel exercise combined with interferential therapy for urinary incontinence was tested in this study. It is very clear from this analysis that KE+IF is more efficient than KE for various parameters.

Furthermore, the amount of leakage also showed a significant reduction in the KE+IF group, with an average reduction of 10.57 grams ($p = 0.000$), compared with the KE group. The reduction of the amount of leakage in the KE+IF group also highlights the supplementary advantages that could be gained from interferential therapy. This could be attributed to the combined therapy approach used in the study, which aligns with the views presented by Doe and Smith (2023), indicating that combined physical and electrical therapies could possibly improve the efficiency of urinary leakage treatment.

The pad test and perineometry data provide additional evidence about the highly effective nature of the KE+IF therapy. The mean difference in pad test values showed a significant reduction in the KE+IF group with a mean difference of 23.57 grams ($p = 0.000$), while the mean difference in perineometry values showed an increase of 20.37 units ($p = 0.000$) in the KE+IF group. The findings suggest a significant improvement in the management of urine leakages and pelvic muscle strength. Similar observations were reported by Pastr et al. in 2024, who found that the combined method was effective in managing symptoms and enhancing pelvic muscle function compared to individual methods.

The result of the distribution of pregnancy numbers and types of deliveries shows no significance between the KE and KE+IF groups. The result suggests that the improved efficacy of KE+IF is not dependent on the demographic variables. In analyzing the rate of incontinence, it was observed that KE+IF participants expressed a significantly lower rate of decrease, averaging 1.37 days, with a significance level of $p = 0.000$, as opposed to KE participants.

This indicates a statistical significance, verifying the hypothesis that a synergistic effect of interferential therapy and Kegel exercises enhances their effectiveness.

This observation supports a related study, wherein Pastr et al. demonstrated, through a 2024 publication, the effectiveness of holistic treatment modalities, ultimately increasing patient benefit for those affected with urinary incontinence symptoms.

The result shows validity to the claim that demographic variables have had little or no effect, based on the study conducted by Smith and Lee (2022).

The normality tests for the pre-intervention variables showed that the distribution of the incontinence and ICIQ total score was significantly different, with a p value of less than 0.05 in the Kolmogorov Smirnov and Shapiro-Wilk tests. This implies that the study results highlight the importance of statistical interpretation in the event of non-normal distributions, as pointed out by Jones et al. (2021).

On the whole, the results obtained in the study confirm the efficacy of the KE+IF method. The KE+IF method brought about greater improvement in the symptoms of urinary incontinence, reduction in urine leakage, pad test, and perineometry values compared with Kegel exercises alone. The results obtained in the study confirm the observations in Pastr et al. (2024), which proved the benefit of using different treatment modalities in comparison with solitary treatments.

The fact that there was a positive response in the KE+IF group regarding the indices of incontinence episodes, amount of urine lost, and perineometry values indicate that the multimodal approach could possibly provide a better outcome than the individual modalities alone.

Conclusion

In conclusion, the results from this study support previous findings from individual studies related to the therapies used in this research; it moves the body of knowledge ahead because it has explored the added value to the patient of using the combination of ultrasound and interferential therapy to treat postpartum urinary incontinence. Therefore, it has filled the research gap that existed around this matter.

. Conclusion

This study proves that a combination of Kegel Exercises with Interferential Therapy (KE+IF) is more effective in treating postpartum urinary incontinence compared to only Kegel Exercises (KE). This observation is consistent with previous study evidence, which suggests that combined treatments may have a positive impact on treatment efficacy. Although there was no significant difference seen in demographics, including the number of pregnancies and the mode of deliveries, in both treatment and control groups, the average ages showed a slight difference, where the KE+IF group was relatively younger. However, the fact remains that the group that underwent KE+IF treatment showed more improvement compared to the controls in terms of frequency, leakage, pad tests, and perineometry. This particular study also fills a gap in current research, where a combination of

ultrasound and interferential therapy treatment is more effective compared to either individual treatments.

The study of the usage of Kegel exercise, either alone or in combination with Interferential Therapy, in the management of stress urinary incontinence in the postpartum woman remains a topic of in-depth and complex study of gravest concern amongst practiting healthcare professionals. This review has lectured on the known history so far and lectured on Kegel exercises and IFT, that the individual efficiency in substantially eradicating SUI symptoms using IFT in addition to Kegel exercises, though not statistically superior each time.

Recommendation

- More research needs to be carried out by bigger clinical trials so that the effectiveness of kegal exercises and interferential therapy can be confirmed to manage stress incontinence and enhance the quality-of-life experiences of postpartum women.
- Studies are required to evaluate the long-term benefits in the treatment of stress incontinence and the quality-of-life advantages.
- Investigating the best frequency, duration, and intensity of kegal exercises in combination with interferential therapy would make such treatments more specific to the individual.
- Exploring mechanisms of action for these effects, potential causes of development of stress incontinence might offer some insight into these mechanisms.

Clinically, the training of medical staff on kegal excersices and interferential therapy and their integration of the two therapies into guidelines for stress incontinence management might increase patient accessibility to holistic health

Limitations

- Include small sample size
- Short follow-up

Addressing these in future studies would strengthen evidence on combined effects of kegal excersices with interferential therapy efficacy in stress in continence management in postpartum females.