RESEARCH PAPER

A Randomized Control Study To Evaluate The Effects Of Action Observation Training On Pelvic Floor Muscle Strengthening In Women

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Received: 11th Jan, 2026; Revised: 24th Feb, 2026; Accepted: 7th Mar, 2026; Available Online: 19th Mar, 2026

ABSTRACT
The well-established traditional methods like Kegel exercises and manual therapy, have certain limitations regarding patient compliance and effectiveness. In this present study, the researchers explored the extent at which pelvic floor muscle contractions in women can be altered through activity observation training. The Primary objective of the study was to assess the effect of Action Observation Training on pelvic floor strength in the present Study included total of 60 participants based on inclusion and exclusion criteria. Married women aged 25 to 40 years, and females who had either self-reported or clinically assessed pelvic muscle dysfunction were included in the study. Whereas females having pregnancy, current use of muscle relaxants, previous spinal surgery, neurological diseases, vaginal infections, and pelvic pathologies were excluded. For assessment of the results, modified Oxford scale in combination with digital palpation was intended. Subjects were divided into two groups among that one group received treatment with action observation and another group received treatment without expounding details. The comparison from baseline to 4th week shows p value of 0.0193. Indeed, a marked increase in the muscle strength was seen in the AOT group. This study presents an innovative and effective rehabilitation method based on the principles of basic motor learning. The study was a part of main study that developed biofeedback for pelvic floor muscles. For the same the study was registered under the Clinical Trial Registry of India with ref no. CTRI/2022/02/040544 and approved by institutional ethical committee of South Gujarat Medical and Research Centre- EC/SPB/036...

Keywords: Pelvic floor dysfunction, Movement control study, Rehabilitation, Women's health, Randomized controlled trial.
How to cite this article: Dave H, Kakkad A, A Randomized Control Study To Evaluate The Effects Of Action Observation Training On Pelvic Floor Muscle Strengthening In Women..Int J Drug Deliv Technol. 2026; 16(2): 146-151; DOI: 10.25258/ijddt.16.2.17
Source of support: Nil.
Conflict of interest: None

INTRODUCTION

In the branch of women's health, the common problem of pelvic floor dysfunction is considered a huge part of daily health and is thought to inversely affect health as a whole.(1) The following study embarks on the thrilling possibility of Activity Observation Training as a treatment method to better the complications of pelvic muscle dysfunctions in a group of women.(2) As part of the randomised controlled trial design, the study seems to be an in-depth attempt at explaining how pelvic rehabilitation works. Pelvic floor muscles play a very important role in safeguarding urinary and fecal climatic conditions, supporting the pelvic floor, and helping in sexual satisfaction in the intricate anatomy of females. (3) Pregnancy, childbirth, hormonal changes, and chronological aging are some factors that place considerable stress on the female pelvic floor. (4) Therefore, a sustainable life requires regular exercises to maintain pelvic floor health throughout life.

These include well-established traditional methods in the clinic, like Kegel exercises and manual therapy, which have certain limitations regarding patient compliance and effectiveness. (5) In this framework, AOT has emerged as a novel therapeutic tool focused on enhancing motor competencies by observing actions. AOT is based on the intentional control of precisely articulated movements, which definitely distinguishes it from more traditional forms of motor rehabilitation.

The complicated neural network that constitutes the mirror neuron system has found applications in everything from sports rehabilitation to recovery from stroke. (6,7) According to the AOT conceptual framework, even observation of movement itself can activate neural pathways and thereby make possible facilitation in the acquisition of motor skills. (8)

This paper thus tries to determine the extent to which AOT can apply motor learning principles in pelvic rehabilitation to achieve significant gains in both the strength and coordination of these vital muscles. The

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Primary objective of the study was to assess the effect of Action Observation Training on pelvic floor strength in females. The peripheral goal of empirical research presents a more appealing and effective approach to pelvic rehabilitation that is likely to result in better patient outcomes, coupled with enhancement of treatment effectiveness.

Methodology

The study was a pragmatic pilot RCT assessor-blinded in that the participants were recruited for pelvic floor physiotherapy. Participants were recruited via primary health clinics, and gynaecologist. Women underwent physiotherapy with Pelvic floor dysfunction and weak Pelvic Floor Muscle strength were screened for the study. Included participants were rendered verbal and written informed consent regarding the study prior to baseline testing and allocation. A chit picking method was used to randomise the women 1:1 to either Action Observation Training Group or Control group. The researcher was blinded to therapy and group allocation. Researcher provided treatment in this study had at least 9 years of experience as a women's health therapist. This study was approved by institutional ethical committee of South Gujarat Medical and Research Centre-EC/SPB/036. There were strict inclusion and exclusion criteria to have a homogeneous cohort to study. These included married women aged 25 to 40 years, who had either self-reported or clinically assessed pelvic muscle dysfunction. (9) The following conditions rendered a participant ineligible for the study: pregnancy, current use of muscle relaxants, previous spinal surgery, neurological diseases, vaginal infections, and pelvic pathologies.

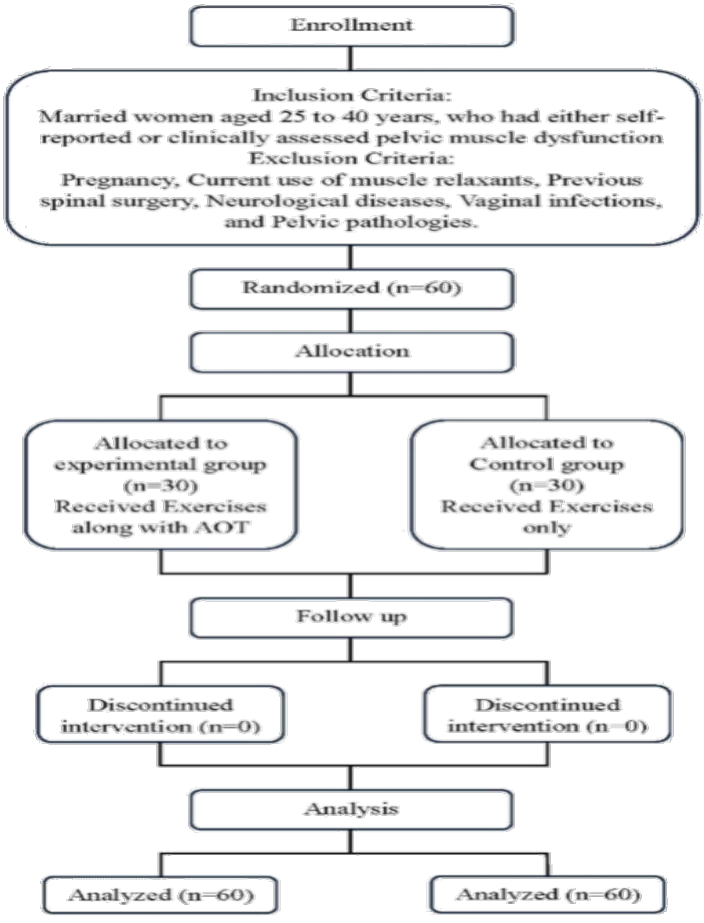


Chart 1: Participant Flow Chart

Both groups received physiotherapy sessions for three times a week over four weeks under close supervision. Static exercises of the abdomen were prescribed to all participants, along with static exercises of the back, bridging exercises, and Kegel exercises to enhance pelvic floor muscle function. In order to maintain proper pelvic muscle training, in experimental group medical models were deliberately used for both biofeedback analysis and visual conceptualization during AOT sessions. AOT sessions were systematically organized so that compliance with pelvic muscle training would be maintained, and medical models to explain biofeedback were used in order to enhance visual understanding. Participants were also encouraged to visualize during

these sessions, thus further strengthening the neuronal foundation that forms the basis for motor learning. Control group received only exercises without any visual context.

This study evaluated the strength and coordination of contractions of the pelvic muscles with a Modified Oxford scale using digital palpation and self-administrative questionnaire. According to scientific integrity, this methodology tries to show intimate knowledge of the complex interplay involved in muscle activity. The primary measure was used both before and after the four-week intervention as a means to determine modifiable effects on the pelvic musculature from AOT.

Data Analysis

Total of 60 participants were included in the study using OpenEpi software to ensure the study was adequately powered. Using a randomized controlled trial design, participants were assigned into experimental or control group by chit picking method. This study was a part of main study that developed biofeedback for pelvic floor muscles. For the same the study was registered under the Clinical Trial Registry of India with ref no. CTRI/2022/02/040544 and approved by institutional ethical committee of South Gujarat Medical and Research Centre- EC/SPB/036.Informed consent was obtained from all the participants.

A structured and reliable platform of procedure describes how data analysis will be done using SPSS version 26. The breadth of analytical tools extends the power of paired tests to identify disparities in pre- and post-intervention measurements within and across groups.

Together with these measures of frequencies and descriptive statistics, the effect sizes and confidence intervals are mentioned to give the interpretation of the results an added specificity. Each respondent gave informed consent as a genuine effort to check their voluntary participation in the research. Strict security measures were maintained to protect the privacy and confidentiality of respondents' data thereby giving integrity to the research. Sample size and timeline. The time frame of this research occurred within a focused, organized period of four weeks.

Results

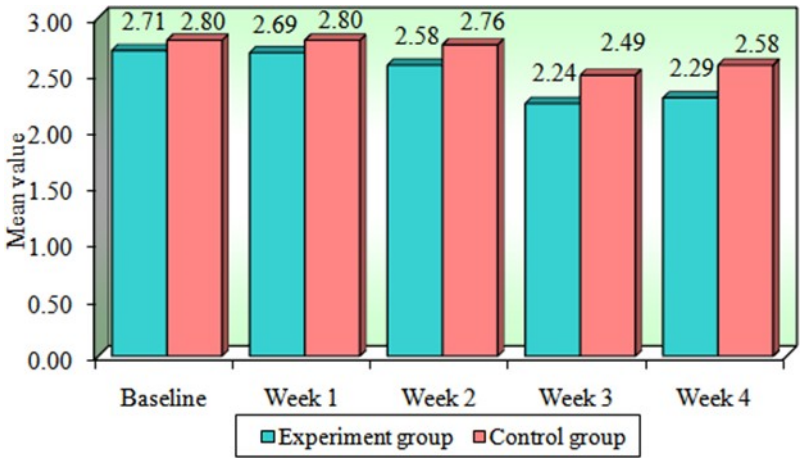
The demographic analysis of the participants shows significant changes in BMI and age between the AOT group and the control group. This methodological tool represents key elements of homogeneous distribution. The discussion of equality and gravida suggests a concordant presence of statistical insignificance, which therefore ensures that the research community recognizes the intrinsic homogeneity within the recruitment group.

Obstetric history is one of the most critical aspects of delivery patterns, furnishing a close representation of child delivery. In the AOT group, the trend seemed to be that 40% experienced FTVD, while for LSCS it was 60%. However, the control group showed an impressive trend, exceeding that of LSCS, at 86.67% in terms of positive outcomes compared to its counterpart.

Time points	Experiment group		Control group		p-value
	Mean	SD	Mean	SD	
Baseline	2.71	0.25	2.80	0.25	0.3322
Week 1	2.69	0.27	2.80	0.25	0.2448
Week 2	2.58	0.23	2.76	0.23	0.0472*
Week 3	2.24	0.23	2.49	0.28	0.0146*
Week 4	2.29	0.25	2.58	0.27	0.0046*
Baseline -Week 1	0.02	0.20	0.00	0.00	0.6669
Baseline -Week 2	0.13	0.25	0.04	0.12	0.2163
Baseline -Week 3	0.47	0.25	0.31	0.20	0.0664
Baseline -Week 4	0.42	0.20	0.22	0.24	0.0193*

*$p<0.05$

Table 1. Comparison of experiment and control groups with Digital Method at different time points by "t test".



Graph:1

Graph 1: Comparison of experiment and control groups with Digital Method at different time points by "t test".

After the intervention, both the experimental and control groups showed a statistically significant improvement in strength of pelvic muscle. However, the AOT group had fared better in terms of positive outcomes compared to its counterpart.

A scientific table articulates-in statistical terms-that after a four-week intervention, the AOT group fared better compared to the control group. The P-value, which is the measure of the statistical significance, shows AOT to be effective in maintaining the contraction and coordination of pelvic muscles. So, among both groups from baseline to week 4 AOT shows p value of 0.0046 which indicates higher significance. No harm or adverse event were noticed during the trial. While recruiting trials no dropouts were noted.

DISCUSSION

The study mentioned higher significance and more strength in experimental group compared to control group. This study investigates the effects of AOT on enhancing the contractions of pelvic floor muscles in women. Scientific discussion elaborates improved pelvic muscular contractions were obtained in the AOT group. This development has been well complemented by earlier findings that asserted the actual effectiveness of AOT in developing muscular strength and motor skills. (10,11)

The result of the study also corelates literature reviews with particular reasons. The incredible improvement regarding contractions of the pelvic muscles during AOT may, therefore, be a result of an activated mirror neuron system.(12) AOT is thus related to the activation of the mirror neuron system and to the noted improvement in the setting of contractions of the pelvic muscles This paper represents highly valued research with a rigid methodological approach; it also adds a different perspective to the discussion by comparing traditional methods of pelvic rehabilitation with AOT.

Research evidence found to show that AOT may focus on aspects of the brain that other therapies have not touched upon. (13) Based on its molecular basis, AOT can target neuronal pathways bypassed by traditional pharmacological interventions. Action Observation Training facilitates the development of novel neural pathways that surpass those accessed through traditional techniques, all intricately linked to the complex functioning of the mirror neuron system. (14, 15)

Although the scientific community acknowledges this study limitation, the sample size reductions coupled with prolonged follow-up periods utilized in assessing the long-term efficacy of AOT effects usher in a great promise for the future. (16,17,18) About the limitation, clinical relevance of AOT has not yet been established. Despite apparent promise, further therapist training and standardized AOT protocols suitable for various vascular conditions are required. The therapy is useful in female with all age groups and also beneficial for maintaining healthy pelvic floor musculature.

CONCLUSION

In a nutshell, the effect of AOT on pelvic floor muscle contraction gives strong evidence that AOT can be great importance to pelvic floor rehabilitation methods. Improvement in contraction of the pelvic muscles, through the traditional methodology, empirically justifies the clinical utility of technique. Integration into clinical practice and future research point this could mark a major turning point in the evolution of pelvic rehabilitation.

Registration and Ethical Approval

This study was a part of main study that developed biofeedback for pelvic floor muscles. For the same the study was registered under the Clinical Trial Registry of India with ref no. CTRI/2022/02/040544 and approved by institutional ethical committee of South Gujarat Medical and Research Centre- EC/SPB/036.

Acknowledgment:

The authors are grateful to all the participants and supporters of this research.

Authors Contribution:
All authors conceived and designed this analysis and participated in interpreting the findings. Himani Dave performed the statistical analysis and drafted the first version of the manuscript. All authors contributed to revising the manuscript and gave their final approval of the submitted version. Himani Dave accepts full responsibility for the overall content and study conduct. Authors declare that no artificial intelligence tools were used in the generation of this manuscript.

Source of funding:
Not applicable

Conflict of interest:
NIL

Individual informed consent was obtained from all participants.
Data will be available upon request.

Abbreviation:
AOT- Action Observation Training
BMI- Body Mass Index
FTVD- Full Term Vaginal Delivery
LSCS- Lower Segment Caesarean Section
SPSS- Statistical Package for Social Sciences
RCT- Randomized Controlled Trail..

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