

Impact of Telehealth Exercise Program on Physical Fitness and Mental Health in Women with Post Cesarean Section Delivery: A Randomized Controlled Trial

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Abstract

Telehealth exercise program can improve physical fitness and mental health. Post-partum females may reduce fitness hence we evaluated the effect of telehealth on these females. This randomized controlled trial was conducted on 35 post-cesarean mothers who randomly divided into 2 groups. Group A (intervention – Telehealth exercise program) received exercises for 3days/week for 6 weeks and group B was control group. Physical fitness (cardiovascular endurance, muscular endurance, strength and flexibility) and mental health (Edinburg postnatal depression scale (EPDS) and State-trait anxiety inventory scale having stress component - STAI-S and trait component-STAI-T) and was assessed before and after the intervention. Group A showed significant improvement ($p<0.001$) than group B in one-minute sit-up (A: 5.28 ± 2.44 , B: 1.18 ± 1.38), sit and reach test (A: 2.57 ± 1.30 , B: 0.29 ± 0.41), six-minute walk test (A: 146.11 ± 51.39 , B: 17.59 ± 14.30), and EPDS (A: 5.16 ± 1.92 , B: 1.24 ± 0.97) whereas one-minute push-up ($p=0.28$), State-trait anxiety inventory scale STAI-S ($p=0.17$), STAI-T ($p=0.93$) showed non-significant improvement between groups. Hence it concludes telehealth exercise program improves physical fitness and depression in postpartum women, whereas anxiety did not show more significant improvement by telehealth exercises and it may needs more time and personal attention for improvement.

Trial registration : This study was also registered under Clinical Trial Registry of India with the Registration number CTRI/2021/11/038207 registered on 23/11/2021

Introduction

The postpartum (puerperium) period begins immediately after delivery and refers to the duration when physiologic changes in the mother related to her pregnancy return to the pre-pregnant phase¹. Numerous complications may occur in the postpartum period including significant physical, mental, and social change. The major reported physical health problems in initial 3 months of postpartum period were fatigue (67%), low back pain (47%), breast issues (37%), perineal pain (30%), urinary incontinence (29%), constipation and hemorrhoids². Increased levels of relaxin hormone causes laxity of various ligaments leading to hyper mobile joints and it makes physical tasks and movements strenuous. Weak abdominal muscles may also cause lower back pain during and post-pregnancy³. Breast problems in postpartum period includes heaviness and tenderness in breasts, and breast engorgement leading to discomfort for new mothers⁴. Postnatal depression is a serious health issue that affects up to 16% of all new mothers worldwide⁵⁻⁸. During pregnancy, depression and anxiety affect 1 in 7 women. Around 50% women who are depressive remains undiagnosed during pregnancy and postpartum period⁸. Various long and short-term effects of cesarean section include increased risks of uterine rupture (0.5-1%), pelvic adhesions (after 2nd caesarian, 12–46%) and intraoperative surgical injury². Furthermore, due to an increased risk of uterine rupture and improper placenta presentation, the risk of maternal death during birth is raised in pregnancies following cesarean delivery².

International recommendations encourage women for engaging in healthy lifestyle following childbirth. Benefits from postpartum exercises are improved cardiovascular fitness, weight reduction and musculoskeletal changes³. Postpartum women continue to face physical and mental health issues, as well as lifestyle and parenting concerns till six weeks after giving birth. Health promotion activities that begin in this duration have the potential to improve women's health and well-being not just in the immediate postpartum period, but also in first year after birth and must be continued beyond the postpartum duration till 1 year³.

During Covid-19 pandemic, which was infectious severe acute respiratory syndrome started in 2020 has severely affected the health and economy worldwide, with millions of people were infected and multiple deaths occurred, resulting in devastating situation and global effort to impose lockdown separately by each country⁹⁻¹⁰. This has led to severe impact on all three components of health including physical, mental, and social health and especially affected high-risk population including Pregnant and post-delivery females. Postpartum women typically face physical and psychological health problems post-delivery, which are difficult to resolve and are at high risk due to weaker immunity^{11,12}. There was

need to identify and investigate strategies to improve postpartum health and fitness levels even when they were at home, taking care of their new born baby as it was difficult to visit hospitals and clinics on regular basis post-delivery.

Telehealth Exercise program, is exercise program of health care in which exercises are delivered via telephone, and/or video calls and/or smartphone apps, and they are increasingly being used to monitor home-based exercise¹³. Especially during the COVID-19 pandemic many health care providers used this telehealth program into clinical practice¹⁴. The advantages of telehealth includes reduced travel time and cost to the clinic, increased accessibility for the rural people where such services are limited, and also increases adherence to the exercise program¹³⁻¹⁴. Video calls also makes the therapist to understand the home environment and assist or modify set up for doing exercises safely. As a result, video consultations are frequently used in chronic diseases and primary care needs^{15,16}. COVID – 19 had a very negative impact on the immunity and overall health of the pregnant female and also during postpartum period¹⁷⁻¹⁸. Hence telehealth program may also be useful for postpartum females in improving their physical and mental health¹⁹⁻²¹. Thus, the aim of this study was to evaluate the effect of telehealth exercise program given to Post-cesarean section on physical fitness and mental health.

Methodology

This single blinded Randomized Control Trial (RCT) was conducted at Dr. D. Y. Patil College of Physiotherapy, Pune on 35 post-partum women. The study commenced from December 2021 to March 2022. Every participant of the study provided their written informed consent prior to the enrollment into the study and all the procedures were conducted according to the Declaration of Helsinki and they were notified of their rights to withdraw at any point of time without any penalty. Also special consent about

COVID 19 pandemic was taken. This study complies with the CONSORT guidelines. There are no participants under the age of 18 in the study. Participants who underwent cesarean section since one month to one year, aged 18–35 years were recruited for the study, Participants were excluded if they had history of mother or child tested positive for covid-19, death of fetus due to any medical complication, involvement in any form of exercise more than once per week since last 6 months, any metabolic and musculoskeletal complications. Sample size was calculated through PRIMER software taking 80% power and 5% significance level, it was 32 but considering 20% dropout rate, final sample size was 38. Hence total 38 samples were randomly allocated in two groups by using computer generated block randomization method, having 19 in each group. One researcher generated random allocation number and the other independent researcher enrolled the participants into the groups. Demographic data was taken before the interventions. All outcome measures were taken pre and post 6 weeks of the interventions. Consort chart was given in fig. No. 1

Ethics and Consent Statement

Details of the study was informed to all the participants. The study was approved by the Dr. D.Y. Patil College of Physiotherapy Institutional Ethics Committee under the reference number DYPCPT/574-B(34)/2021 dated 25/06/2021. This study was also registered under Clinical Trial Registry of India (Registration No. CTRI/2021/11/038207 dated 23/11/2021). Every human participant provided their written informed consent prior to the enrollment into the study and all the procedures were conducted according to the Declaration of Helsinki.

Procedure:

Group A was experimental group where participants were enrolled for telehealth exercise program. Telehealth Exercise program is exercise intervention program in which participants perform exercises at home under the supervision of researcher through online mode using mobile app. – Zoom platform. All instructions including importance of the study, how to use video conferencing application, placement of the camera while exercising at home, what time the session began, duration of each session and total study was given to group A participants. The exercise was supervised online through zoom platform for 30 minutes duration. Group B was control groups whom same exercises were explained on the first day and instructed to performed at home on regular basis so they performed home based unsupervised exercises. Three dropout were noted, one from group A due to lost to follow-up as she shifted to her new house after 2 weeks of intervention and 2 from group B, one lost to follow-up due to some emergency at home and one discontinued due to baby's bad health. Hence 35 participants completed study, total 18 in group A and 17 in group B. Intervention in the group A was given 3 times per week for 6 weeks. The progression was done every 2 weeks in terms of repetitions. Exercises were given in 2 circuits for 30 minutes initially progressing to 35 min. and 40 min. after 4 weeks and 6 weeks respectively. Session attendance was monitored by the researcher on the attendance record monitoring sheet after participation in each telehealth exercise program, whereas all participants of group B performed Home

based exercises as explained by their own as routine practice. This was reviewed after the completion of 6 weeks and those who completed the protocol as per the instructions was finally considered. Protocol was given to postpartum women after minimum one month of caesarian section as mentioned in table no. 1.

Table No. 1: Exercises protocol given to post-partum mothers after one month of caesarian section :

Type	Name of exercises	No. of repetitions for 1–2 weeks	No.of repetitions for 3-4 weeks	No.of repetitions for 5–6 weeks
Warm up exercises	slow spot marching	15 on Each side	20 on Each side	25 on Each side
	Shoulder flexion-extension and adduction-Abduction	8–8 on each side	10–10 on each side	12–12 on each side
	Slow walking	For 2 min.	For 3 Min.	For 4 Min.
Free Exercises	Hip-Knee flexion	8 on each side	10 on each side	12 on each side
	Unilateral SLR	8 on each side	10 on each side	12 on Each side
	Hip Adduction- Abduction	8 on each side	10 on each side	12 on each side
	Dynamic quadriceps	8 on each side	10 on each side	12 on each side
	Pelvic bridging	8	10	12
	Kegel's exercise	8	10	12
	Cat-Camel exercises	8	10	12
	Curl-up exercises	8 times	10 times	12 times
	Wall Squats	5 times	8 times	10times
Cool down exercises	Stretching (hamstrings, calf, trapezius, quadriceps, piriformis),	3 times each	5 times each	8 times each
	Deep breathing exercises	8 times	10 times	12 times

Outcome Measures:

All outcomes were assessed by independent researcher; who was not aware about the group allocation. Hence researcher who assessed all outcome measures was blinded for the group allocation and assessed participants through a code numbers. It was assessed on 1st physical visit as pre parameters and a visit immediately after completion of 6 weeks as post parameters.

- **For Physical fitness:**

Test for assessment of arm and upper body muscle strength and endurance

One-minute push-up test

Started in prone position, keeping elbows in extended position and palm and fingers of hands lying on exercise mat at chest level, knees were rested on the ground with ankles crossed each other. The participant first symmetrically bent their elbows till they attained lower angle of 90 degrees between the arm and forearm. The participant then returned back to the beginning position by extending elbows, repeated for one minute and total count was recorded ²².

Test for assessment trunk and lower limb muscle strength and endurance

One-minute sit-up test

Started in supine, with legs and knees in bend, feet on the floor, both arms and elbows in extended position on the floor. Participants began by moving forward, bending hands clasping their knees, and foreheads above the knee line. Then participants moved back until shoulder blades are on the floor, repeated for one minute and total count was recorded. This tests are quite reliable (correlation values ranged from 0.92 to 0.95)²³.

Test for assessment of muscle flexibility

Sit and reach test

Reliability and validity for modified sit-and-reach tests for hamstrings flexibility is $r = 0.77^{24}$. According to YCMA, tape was placed across yardstick at right angle to the 15-inch mark. The patient sat with the yardstick placed in between the legs, with the knees extended and heels touching the edge of the tape, with 12 inches apart. The patient then slowly moved forward placing hands facing palms down, as forward as possible, hold the position and reading was measured. The score is the maximum distant point (cm) reached with the fingertips. The best of 3 trials is recorded ²⁵.

Test for assessment cardiopulmonary endurance

Six-minute walk test

In 6 MWT therapist kept the track of baseline oxygen saturation, heart rate, and blood pressure, as well as dyspnea and exhaustion on the Borg scale. At the end of 30 meters, the walking path was demarcated, and cones was placed. Participants was instructed to walk as fast as possible and as feasible to them. Therapist give encouragement. After completion, B.P., H.R, and oxygen saturation, dyspnea and exhaustion on the Borg scale was assessed. The distance travelled are measured and documents for the record purpose ²⁶.

- For Mental fitness:

Test for assessment of depression

The Edinburgh Postpartum Depression Scale (EPDS)

It has ten self-reported questions that are assessed on a 4-point scale from 0 to 3. The measure is rated from 0 to 30, with cut-off point of 13 or higher scores indicating likelihood of postpartum depression. It has high level of test-retest reliability (90.7%) ²⁷.

Test for assessment of anxiety

The State-Trait Anxiety Inventory (STAI): It is a widely used measure two distinct types of anxiety: state anxiety (temporary, situational) and trait anxiety (long-standing, personality-based). The most often used version, Form Y, contains 20 items for assessing state anxiety and another 20 for trait anxiety. The scale's internal consistency coefficients ranged from 0.86 to 0.95, while reliability coefficients ranged 0.65 to 0.75 during a two-month period ²⁸.

Statistical Analysis:

Data were analyzed using the statistical package SPSS 26.0 (IBM SPSS Inc., Chicago, IL) and level of significance was set at $p < 0.05$. Normality of the data were assessed using Shapiro Wilkinson test. Normally distributed data were analyzed by paired t test and t test whereas normally not distributed, data were analyzed using Mann Whitney U test and Wilcoxon sign rank test.

Result

Table 2. showed mean age of females in group A was 28.78 ± 4.02 and group B was 27.15 ± 4.03 whereas mean no. of parity in females of group A was 1.52 ± 0.61 and group B was 1.42 ± 0.5 . Both groups showed non-significant difference in age ($p=0.21$) and no. of parity ($p=0.56$) hence both groups were age and parity matched. The comparison of baseline characteristics of One-minute push-up test, one-minute sit-up test, Sit-and-reach test, Six-minute walk test, EPDS and STAI indicated non-significant differences in both groups hence both groups were comparable. This table 3 shows pre-post comparison of both

groups individually which indicates that significant differences within group analysis as $p < 0.01$ in all physical fitness and mental health. When post outcomes measures of both groups were compared, it showed significant improvement in Group A more than the group B except one-minute pushup test ($p = 0.28$), STAI-S ($p = 0.17$) and STAI-T ($p = 0.93$). (Table 4)

Table 2 : Comparison of baseline characteristics of both group A and B.

Characteristics	Mean $\pm$ SD of Group A (n=18)	Mean $\pm$ SD of Group B (n=17)	P value
Age in years	28.78 $\pm$ 4.14	27.47 $\pm$ 4.16	0.21
Parity – No. of delivery	1.52 $\pm$ 0.61	1.42 $\pm$ 0.5	0.56
One-minute Pushup Test (No. of rep.)	6.94 $\pm$ 2.94	8.41 $\pm$ 3.02	p = 0.15
One-minute Sit-up Test (No. of rep.)	13.89 $\pm$ 2.45	13.94 $\pm$ 3.82	p = 0.96
Sit and reach Test (cm)	3.89 $\pm$ 1.78	3.20 $\pm$ 0.90	p = 0.16
Six minute walk test (meters)	583.89 $\pm$ 103.87	615.47 $\pm$ 70.60	p = 0.30
EPDS	11.11 $\pm$ 2.81	10.35 $\pm$ 2.00	p = 0.36
STAI-S	48.94 $\pm$ 5.15	49.06 $\pm$ 4.51	p = 0.94
STAI-T	47.56 $\pm$ 5.76	47.76 $\pm$ 5.11	P = 0.91

S.D – Standard Deviation; EPDS- Edinburg Postnatal Depression Scale; STAI-S - State-Trait Anxiety Inventory Scale assessing State Anxiety; STAI-T State-Trait Anxiety Inventory Scale assessing Trait Anxiety

Table 3 : Comparison of Pre- post-intervention outcomes for Group A and Group B :

Tests	Group	Pre mean and SD	Post mean and SD	Difference	P value
One-minute pushup test (No. of rep.)	A	6.94 $\pm$ 2.94	11.39 $\pm$ 3.94	4.44 $\pm$ 2.18	p<0.001*
	B	8.41 $\pm$ 3.02	9.94 $\pm$ 2.90	1.53 $\pm$ 1.59	p=0.001*
One-minute sit-up test (No. of rep.)	A	13.89 $\pm$ 2.45	19.17 $\pm$ 2.28	5.28 $\pm$ 2.44	p<0.001*
	B	13.94 $\pm$ 3.82	15.29 $\pm$ 3.96	1.35 $\pm$ 1.32	p<0.001*
Sit and reach test (cm)	A	3.89 $\pm$ 1.78	6.70 $\pm$ 1.74	2.82 $\pm$ 1.21	p<0.001*
	B	3.20 $\pm$ 0.90	3.63 $\pm$ 0.94	0.43 $\pm$ 0.37	p<0.001*
Six minute walk test (meters)	A	583.89 $\pm$ 103.87	730.0 $\pm$ 72.68	146.11 $\pm$ 51.39	p<0.001*
	B	615.47 $\pm$ 70.60	640.41 $\pm$ 68.19	24.94 $\pm$ 23.16	p<0.001*
EPDS	A	11.11 $\pm$ 2.81	5.94 $\pm$ 1.35	5.17 $\pm$ 1.92	p<0.001*
	B	10.35 $\pm$ 2.00	8.94 $\pm$ 1.68	1.41 $\pm$ 0.87	p<0.001*
STAI-S	A	48.94 $\pm$ 5.15	45.00 $\pm$ 4.70	3.94 $\pm$ 2.07	p<0.001*
	B	49.06 $\pm$ 4.51	45.82 $\pm$ 5.29	3.24 $\pm$ 2.73	p<0.001*
STAI-T	A	47.56 $\pm$ 5.76	44.89 $\pm$ 5.78	2.67 $\pm$ 1.41	p<0.001*
	B	47.76 $\pm$ 5.11	45.71 $\pm$ 4.97	2.06 $\pm$ 1.89	p<0.001*

* Significant; S.D – Standard Deviation; EPDS- Edinburg Postnatal Depression Scale; STAI-S - State-Trait Anxiety Inventory Scale assessing State Anxiety; STAI-T State-Trait Anxiety Inventory Scale assessing Trait Anxiety

Table 4: comparison of post-test outcomes of both groups and pre-post difference between Group A and Group B.:

Outcome measures	post-test comparison of both groups	Comparison of Pre-post difference of both groups
One-minute pushup test (No. of rep.)	p = 0.22	p < 0.001*
One-minute sit-up test (No. of rep.)	p = 0.001*	p < 0.001*
Sit and reach test (cm)	p < 0.001*	p < 0.001*
Six minute walk test (meters)	p < 0.001*	p < 0.001*
EPDS	p < 0.001*	p < 0.001*
STAI-S	p = 0.62	p = 0.39
STAI-T	p = 0.65	p = 0.28

* Significant; EPDS- Edinburg Postnatal Depression Scale; STAI-S - State-Trait Anxiety Inventory Scale assessing State Anxiety; STAI-T State-Trait Anxiety Inventory Scale assessing Trait Anxiety

Discussion

The present study examined the impact of telehealth on physical fitness and mental health among women following cesarean section. After a 6-week exercise intervention delivered through video consultations (via the Zoom platform), women in the postpartum period (3–12 months) demonstrated significant improvements in both physical fitness and mental well-being. Participants in the control group, who were instructed in standardized exercises on the first day and asked to continue them independently at home for six weeks, also showed notable improvements in physical fitness and mental health through self-directed activity. However, when comparing the two groups, no significant differences were observed in anxiety levels or in upper limb and back muscle strength. Despite this, the telehealth group showed greater improvements across most other measures of physical fitness and mental health. These findings suggest that telehealth-delivered exercise programs not only enhance physical health but also play a meaningful role in improving psychological well-being, particularly in reducing depressive symptoms in this population. The use of telehealth in obstetrics has increased considerably in recent years²⁰. Previous studies have reported comparable outcomes between prenatal and postnatal telehealth consultations, with high levels of patient satisfaction for virtual care^{29–30}. Additionally, some research has indicated an increased rate of cesarean deliveries among uninfected women during the COVID-19 pandemic¹². Nonetheless, existing literature on cesarean sections has certain limitations, particularly regarding their long-term effects on women's health and potential adverse outcomes in subsequent pregnancies³¹.

The observed improvements in the telehealth group suggest that women are willing to engage in exercise when they receive clear instructions, appropriate guidance, and adequate motivation, enabling

them to perform the exercises correctly. These findings are consistent with a study by Poon, Eric Tsz-Chun et al. (2024), which also reported positive effects of tele-exercise interventions on physical fitness³². Current guidelines indicate that incorporating exercises such as push-ups and curl-ups during the postpartum period can effectively enhance muscular strength and conditioning^{3,33}. Additionally, various forms of stretching—including static, dynamic, and pre-contraction techniques—are proven to improve flexibility and muscle extensibility^{34–35}. In the present study, participants were instructed to perform self-stretching exercises for five minutes during the cool-down phase. The control group showed improvement when compared pre-post values due to the fact that Physiological changes that occur during pregnancy will return to normal during the postpartum period³⁶.

Improvements in both muscular and cardiovascular endurance were also observed following the telehealth intervention, as engaging in exercise for at least 30 minutes per day is known to enhance endurance capacity. Furthermore, submaximal exercise testing provides valuable insights into patients' functional abilities in daily life, particularly during pregnancy and the postpartum period^{37–38}. Given the complex physical and psychological changes experienced by women during the postpartum period, which represents a distinct life stage, trained exercise professionals provides individualized exercise prescriptions and tailored physical activity guidance which may be helpful for the improvements of their health outcomes^{39,40}.

Depression and anxiety are well recognized for their immediate as well as long-term impacts on maternal mental health⁴¹. In this study, a significant reduction in depression levels was observed within both groups, as reflected by improved post-intervention scores. These findings are supported by previous research indicating that even a single session of exercise can enhance positive mood states—such as increased energy, positivity, and a sense of refreshment—while simultaneously reducing negative states like tension, anxiety, and confusion^{5,8}. Although all participants were instructed in similar exercises, the experimental group benefited from individualized supervision, guidance, and real-time feedback, enabling them to learn and perform the exercises more effectively. Additionally, the telehealth program allowed for immediate resolution of queries after each session, which likely shows less dropout rates and overall effectiveness. Anxiety levels also decreased in both groups, with no significant differences observed between them. This suggests that exercise itself has a beneficial impact on mental health, and consistent participation can contribute to improved psychological well-being.

The effective delivery of the program, along with the very low dropout rate, highlights its efficiency, feasibility, consistency, and the strong motivation among mothers to enhance overall physical conditioning after delivery. The physiotherapist reinforced the importance of regular weekly exercise, and participants were also given the opportunity to build social connections with other new mothers, particularly during the lockdown period. Telehealth interventions delivered by healthcare professionals may be a cost-effective approach to improving the well-being of new mothers.

The study had certain limitations, mainly it was conducted exclusively on women who had undergone cesarean delivery, without including those who experienced vaginal birth. Additionally, anthropometric measures were not taken into account, and changes in weight-related parameters were not evaluated. Future research should focus on identifying barriers that affect health outcomes and explore how telehealth can be utilized to address them through targeted interventions in postpartum conditions. Further studies are also recommended to assess the applicability and effectiveness of telehealth interventions across a wider range of medical conditions

This study concludes that a telehealth-based exercise program led to greater improvements in physical fitness and depressive symptoms among postpartum women compared to the control group. Although no statistically significant differences were found between the groups in terms of anxiety and upper limb strength, the telehealth group still demonstrated comparatively better outcomes. Overall, telehealth emerges as a positive, user-friendly, convenient, and widely accepted mode of healthcare delivery. It enables the provision of personalized or group-based exercise interventions within the individual's own environment through virtual platforms, while effectively addressing both physical and psychological aspects of well-being.

Declarations

Ethics Approval and Consent to participate

The study adhered to the policies and procedures of the Declaration of Helsinki and its later amendments. The study was approved by the Dr. D.Y. Patil College of Physiotherapy Institutional Ethics Committee under the reference number DYPCPT/574-B(34)/2021 dated 25/06/2021. Every participants gave written informed consent to participate in the study and they were notified of their rights to withdraw at any point of time without any penalty.

This study complies with the CONSORT guidelines.

There are no participants under the age of 18 in the study.

Consent for publication: All participants assigned written informed consent for publication of personal and clinical data.

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Author Contributions Statement

M.R. , R. J. and S. A. developed the main concept of the manuscript and study, as well as wrote main manuscript, S. A. Collected Data, P. G., S. A., N.K. and R. D. did Statistical analysis, All authors reviewed the manuscript, N.K edited final manuscript

Conflict of Interest: Authors declare no conflicts of interest.

Data Availability: The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

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References

1. Lim S, Tan A, Madden S, Hill B. Health Professionals' and Postpartum Women's Perspectives on Digital Health Interventions for Lifestyle Management in the Postpartum Period: A Systematic Review of Qualitative Studies. *Front Endocrinol (Lausanne)*. 2019;10:767.
2. Woolhouse H, Gartland D, Perlen S, Donath S, Brown SJ. Physical health after childbirth and maternal depression in the first 12 months post partum: results of an Australian nulliparous pregnancy cohort study. *Midwifery*. 2014;30:378–84.
3. Mottola MF. Exercise in the postpartum period: practical applications. *Curr Sports Med Rep*. 2002;1:362–8.
4. Shitie A, Adimasu A, Tsegaye D, et al. Breast problems and associated factors among lactating women in Northeast Ethiopia, 2022. *Sci Rep*. 2024;14:9202. <https://doi.org/10.1038/s41598-024-58957-0>.
5. Norman E, Sherburn M, Osborne RH, Galea MP. An exercise and education program improves well-being of new mothers: a randomized controlled trial. *Phys Ther*. 2010;90:348–55.
6. Oskovi-Kaplan ZA, Buyuk GN, Ozgu-Erdinc AS, Keskin HL, Ozbas A, Moraloglu Tekin O. The Effect of COVID-19 Pandemic and Social Restrictions on Depression Rates and Maternal Attachment in Immediate Postpartum Women: a Preliminary Study. *Psychiatr Q*. 2021;92:675–82.
7. Ross LE, McLean LM. Anxiety disorders during pregnancy and the postpartum period: A systematic review. *J Clin Psychiatry*. 2006;67:1285–98.
8. Wenzel A, Stuart SC. Anxiety in childbearing women: Diagnosis and treatment. *American Psychological Association*; 2011. <https://doi.org/10.1037/12302-000>.
9. Davenport MH, Meyer S, Meah VL, Strynadka MC, Khurana R. Moms Are Not OK: COVID-19 and Maternal Mental Health. *Front Glob Womens Health*. 2020;1:1.
10. Pascarella G, Strumia A, Piliengo C, Bruno F, Del Buono R, Costa F, et al. COVID-19 diagnosis and management: a comprehensive review. *J Intern Med*. 2020;288:192–206.
11. Price BB, Amini SB, Kappeler K. Exercise in pregnancy: effect on fitness and obstetric outcomes-a randomized trial. *Med Sci Sports Exerc*. 2012;44:2263–9.
12. Zhang J, Zhang Y, Ma Y, Ke Y, Huo S, He L, et al. The associated factors of cesarean section during COVID-19 pandemic: a cross-sectional study in nine cities of China. *Environ Health Prev Med*. 2020;25(1):60.

13. van den Bergh R, Bloem BR, Meinders MJ, et al. The state of telemedicine for persons with Parkinson's disease. *Curr Opin Neurol*. 2021;34:589–97.
14. Dorsey E, Okun MS, Bloem BR. Care, convenience, comfort, confidentiality, and contagion: the 5 C's that will shape the future of telemedicine. *J Parkinson's Dis*. 2020;10(3):893–7.
15. Bertoncello C, Colucci M, Baldovin T, Buja A, Baldo V. How does it work? Factors involved in telemedicine home-interventions effectiveness: A review of reviews. *PLoS One* 2018 15;13:e0207332.
16. Mallow JA, Petitte T, Narsavage G, Barnes E, Theeke E, Mallow BK, et al. The Use of Video Conferencing for Persons with Chronic Conditions: A Systematic Review. *Ehealth Telecommun Syst Netw*. 2016;5:39–56.
17. Vale AJM, Fernandes ACL, Guzen FP, Pinheiro FI, de Azevedo EP, Cobucci RN. Susceptibility to COVID-19 in Pregnancy, Labor, and Postpartum Period: Immune System, Vertical Transmission, and Breastfeeding. *Front Glob Womens Health*. 2021;2:602572.
18. Gildner TE, Thayer ZM. Maternal and child health during the COVID-19 pandemic: Contributions in the field of human biology. *Am J Hum Biol*. 2020;32:e23494.
19. Peters L, Greenfield G, Majeed A, Hayhoe B. The impact of private online video consulting in primary care. *J R Soc Med*. 2018;111:162–6.
20. Vincze L, Rollo ME, Hutchesson MJ, Callister R, Collins CE. VITAL change for mums: a feasibility study investigating tailored nutrition and exercise care delivered by video-consultations for women 3–12 months postpartum. *J Hum Nutr Diet*. 2018;31:337–48.
21. Aziz A, Zork N, Aubey JJ, Baptiste CD, D'Alton ME, Emeruwa UN, et al. Telehealth for High-Risk Pregnancies in the Setting of the COVID-19 Pandemic. *Am J Perinatol*. 2020;37:800–8.
22. Ojeda ÁH, Maliqueo SG, Barahona-Fuentes G. Validity and reliability of the Muscular Fitness Test to evaluate body strength-resistance. *Apunts Sports Med*. 2020;55:128–36.
23. Ryman Augustsson S, Bersås E, Magnusson Thomas E, Sahlberg M, Augustsson J, Svantesson U. Gender differences and reliability of selected physical performance tests in young women and men. *Adv Physiotherapy*. 2009;11:64–70.
24. Chung PK, Yuen CK. Criterion-related validity of sit-and-reach tests in university men in Hong Kong. *Percept Mot Skills*. 1999;88:304–16.
25. Ayala F, Sainz de Baranda P, De Ste Croix M, Santonja F. Reproducibility and criterion-related validity of the sit and reach test and toe touch test for estimating hamstring flexibility in recreationally active young adults. *Phys Ther Sport*. 2012;13:219–26.
26. Holland AE, Spruit MA, Troosters T, Puhan MA, Pepin V, Saey D, et al. An official European Respiratory Society/American Thoracic Society technical standard: field walking tests in chronic respiratory disease. *Eur Respir J*. 2014;44:1428–46.
27. Cox JL, Holden JM, Sagovsky R. Detection of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale. *Br J Psychiatry*. 1987;150:782–6.

28. Spielberger C, Gorsuch R, Lushene R, Vagg PR, Jacobs. Gerard. Manual for the State-Trait Anxiety Inventory (Form Y1 – Y2). CA:Consulting Psychologists; 1983.
29. Pflugeisen BM, McCarren C, Poore S, Carlile M, Schroeder R. Virtual Visits: Managing prenatal care with modern technology. *MCN Am J Matern Child Nurs*. 2016;41:24–30.
30. Pflugeisen BM, Mou J. Patient Satisfaction with Virtual Obstetric Care. *Matern Child Health J*. 2017;21:1544–51.
31. Sandall J, Tribe RM, Avery L, Mola G, Visser GH, Homer CS, et al. Short-term and long-term effects of caesarean section on the health of women and children. *Lancet*. 2018;392:1349–57.
32. Poon ET, Sun F, Tse AC, et al. Effectiveness of tele-exercise training on physical fitness, functional capacity, and health-related quality of life in non-hospitalized individuals with COVID-19: The COFIT-HK study. *J Exerc Sci Fit*. 2024;22(2):134–9. 10.1016/j.jesf.2024.01.003.
33. Miller MJ, Kutcher J, Adams KL. Effect of Pregnancy on Performance of a Standardized Physical Fitness Test. *Mil Med*. 2017;182:e1859–63.
34. Curry BS, Chengkalath D, Crouch GJ, Romance M, Manns PJ. Acute effects of dynamic stretching, static stretching, and light aerobic activity on muscular performance in women. *J Strength Cond Res*. 2009;23:1811–19.
35. Moore MA, Hutton RS. Electromyographic investigation of muscle stretching techniques. *Med Sci Sports Exerc*. 1980;12:322–9.
36. Martin C, Rokibullah R, Sofinia H. The Physiological Changes In The Postpartum Period After Childbirth. *Asian J Social Humanit*. 2022;1(03):105–18. <https://doi.org/10.59888/ajosh.v1i03.19>.
37. Dibblee L, Graham TE. A longitudinal study of changes in aerobic fitness, body composition, and energy intake in primigravid patients. *Am J Obstet Gynecol*. 1983;147:908–14.
38. MacArthur C, Winter HR, Bick DE, Knowles H, Lilford R, Henderson C, et al. Effects of redesigned community postnatal care on womens' health 4 months after birth: a cluster randomized controlled trial. *Lancet*. 2002;359:378–85.
39. Inge P, Orchard JJ, Purdue R, Orchard JW. Exercise after pregnancy. *Aust J Gen Pract*. 2022;51:117–21.
40. Soan EJ, Street SJ, Brownie SM, Hills AP. Exercise physiologists: essential players in interdisciplinary teams for noncommunicable chronic disease management. *J Multidiscip Healthc*. 2014;7:65–8. 10.2147/JMDH.S55620. Published 2014 Jan 29.
41. Ferrari N, Joisten C. Impact of physical activity on course and outcome of pregnancy from pre- to postnatal. *Eur J Clin Nutr*. 2021;75:1698–709.

Figures

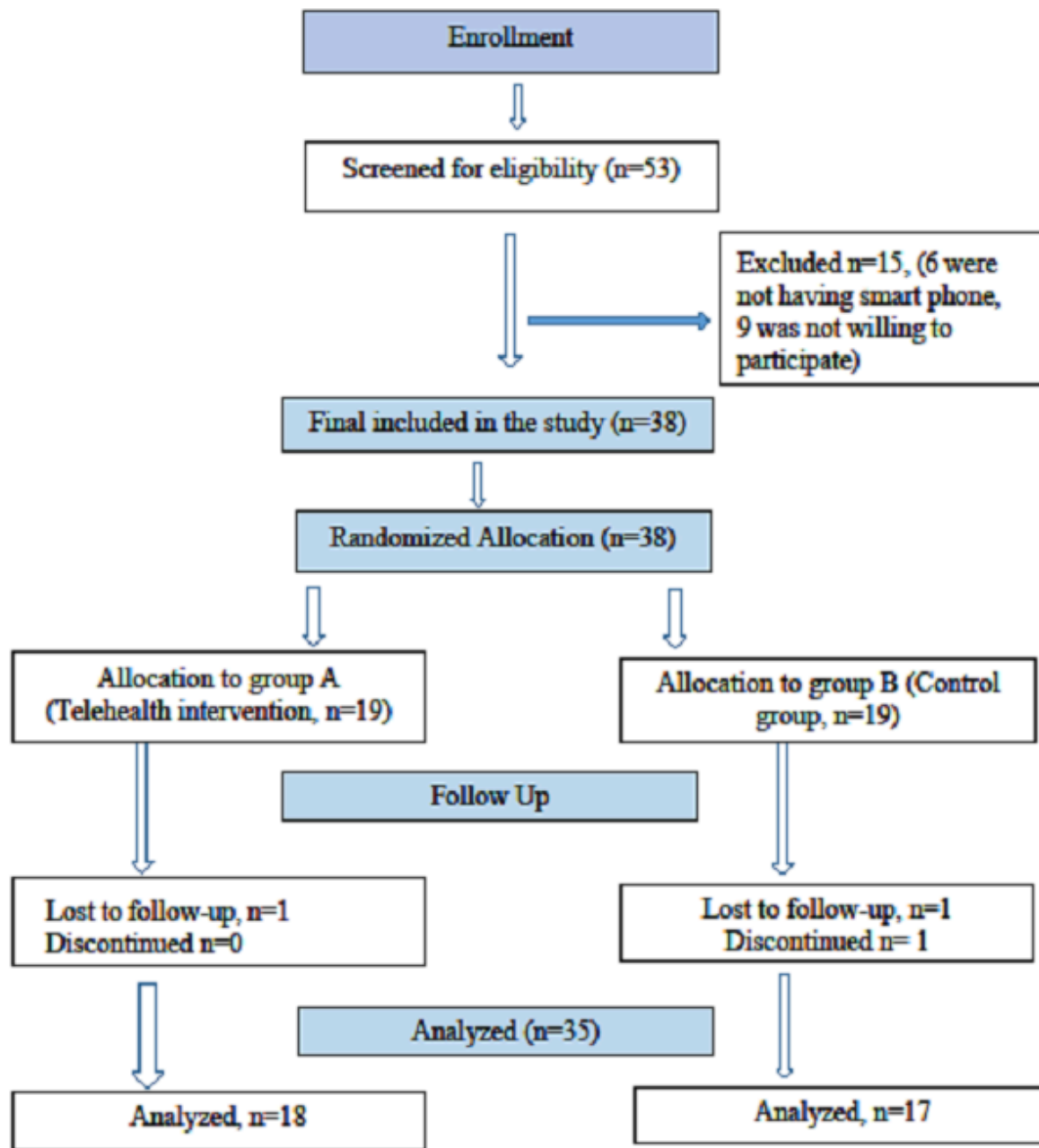


Fig. 1: Consort (Consolidated Standards of reporting Trails) Flow Diagram of the study

Figure 1

See image above for figure legend

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