

Impact of two intervention packages on the health and fitness of ante - and post-natal women attending in a teaching hospital

Pradip Kumar Sarkar¹, Paramvir Singh², Mandeep Singh Dhillon³,
Amarjeet Singh⁴, Sudip Bhattacharya⁵

¹Department of Physical & Rehabilitation Medicine PGIMER, Chandigarh, ⁴Department of Community Medicine and School of Public Health, PGIMER, Chandigarh, ³Department of Orthopaedics, PGIMER, Chandigarh, ²Department of Sports Science, Punjabi University, Patiala, ⁵Independent Public Health Researcher, Dehradun, India

ABSTRACT

Introduction: Pregnancy brings about many changes in mothers' body which continue even after the baby is born. After a vaginal delivery, taking good care of the mother is an essential part of postpartum care and to maintain overall fitness. **Objective:** The purpose of this research was to evaluate the effect of a physiotherapeutic intervention to improve the maternity fitness of Indian women. **Methodology:** It was a three-group RCT (randomized controlled trial). The target population consisted of women in ante and postnatal stage, 50 participants (58 were included in the end) in each group, randomly selected from Obstetrics and Gynecology OPD of a tertiary care hospital in North India. The study was carried out in the department of PRM (Physiotherapy). A total of 174 participants was included in the study and was divided into three groups, two intervention groups, and one control group. The target population consisted of women in ante and postnatal stage, randomly selected from ANC (Antenatal clinic) and PNC (Post-natal clinic). The study was conducted over a period of 4 years (2014–2018). They were advised to do exercise, postural correction, regular walking, and electrotherapy modalities and six follow-ups throughout their pregnancy. Outcome measures like (Visual Analogue Scale = VAS): Low and upper back pain relief ($n = 158$), Leg cramps ($n = 41$), Coccyx pain ($n = 36$), Sacro-iliac joint pain ($n = 26$) was considered. **Results:** The impact of the intervention package on both ante-natal and post-natal women with fitness-related health problems showed significant improvement. **Conclusion:** Pain, leg cramp and heaviness in the lower limb, coccyx pain, etc., during pregnancy are common complaints that start early in pregnancy and may persist throughout life if treatment does not start early in the pregnancy.

Keywords: Normal delivery, pre-and post-natal fitness problems, pregnancy, RCT, two intervention packages

Introduction

Health and fitness are the two aspects of the same coin; these are inter-related and dependent on each other. No doubt health has been the major concerned on which fitness lies. As per the

guidelines of the World Health Organization (WHO), health has four domains, viz. Physical health, mental health, Emotional health and Social health. Gender wise, through the period of evolution and civilization the distribution of work, has been pre-decided and it has gone through a long period of follow-up.^[1] After industrialization, the participation of both genders in a similar type of work tendencies has been adopted.^[2] It has a great impact on women health, specifically during pregnancy.

Address for correspondence: Sudip Bhattacharya,
Independent Public Health Researcher, Dehradun, India.
E-mail: drsudip81@gmail.com

Received: 02-03-2021

Revised: 04-07-2021

Accepted: 09-07-2021

Published: 05-11-2021

Access this article online

Quick Response Code:



Website:
www.jfmpc.com

DOI:
10.4103/jfmpc.jfmpc_427_21

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Sarkar PK, Singh P, Dhillon MS, Singh A, Bhattacharya S. Impact of two intervention packages on the health and fitness of ante - and post-natal women attending in a teaching hospital. J Family Med Prim Care 2021;10:3738-47.

Pregnancy brings about many changes in mothers' body which continue even after the baby is born. After a vaginal delivery, taking good care of the mother is an essential part of postpartum care and to maintain overall fitness.^[3] It takes about 6 month time for restoration of muscle tone and connective tissue to the pre-pregnant state. But the full restoration of fitness is not always possible; women usually lose the shape of their body permanently. In the modern era, almost every woman wishes to bring back and maintain her shape as it was in the pre-pregnant state.^[4]

Because of all the changes, some muscles groups become too tight as a result of pregnancy e.g, hip flexors, lower back, thighs, chest, shoulders, (particularly muscles that elevate the shoulder blades) and back of the neck. Some muscle groups that weaken as a result of pregnancy are pelvic floor, upper back muscles, external rotators of the shoulder, buttocks, front of the neck and abdominal wall.^[5] It leads to adverse health consequences of women in pre and postpartum stages like back pain,^[6] coccyx pain,^[7] sacro-iliac joint pain,^[8] leg cramps,^[9] postural deviation,^[10] incontinence,^[11] respiratory disturbance, etc.

Given the "culture of silence" regarding women's health that typifies developing countries and the constraints from living conditions; particularly for women.^[12] The use of health service by them is naturally less than desirable and is usually delayed. Those who belong to the affluent family will receive good nutrition but maximum women in India are devoid of basic nutrition.^[13] Doctors in Obstetrics and Gynecology department are busy to deliver basic medical services to save the life of mother and child, they can only advise verbally to do the exercise and precautions, which is hardly followed by the mother. So the morbidity risk is very high.^[14] Participation of women in the workforce has increased manifold. For this, she needs to keep herself fit. But in India, no such special fitness clinics are available, except in very few hospitals. Even there, these are attended by some highly motivated physician or physiotherapists.

Earlier in the joint family system, supports in terms of care and advice were available to women during pregnancy and after delivery. But in modern society, joint families have given way to the nuclear family. Thus, the women are, now a day's facing double jeopardy. On one hand, with the reduction of family size and breakdown of joint family, there are, now, no female relatives to guide the pregnant women as to what to eat, how to deal with pregnancy-related symptoms and how to prepare for delivery.^[15] Against this background of withdrawal of support to pregnant mothers from the family, the medical profession has responded in the form of conducting trials of birth preparedness.^[16] The objective is to minimize the problems during pregnancy through effective precautionary actions by self-care during pregnancy, labor and after delivery. The qualified health care and fitness provider needs to deliver scientifically and evidenced-based health package so that in prenatal and postnatal stage, the mother suffers fewer complications and recover as early as possible.^[17] It has got many beneficial effects.

The most important exercises in the first few days after birth are pelvic floor exercises. Start doing them as soon as she can. Strengthening the pelvic floor will help to protect against having accidental urine leaks.^[18] Pelvic floor exercises will also help perineum and vagina to heal more quickly.^[19] That's because the exercises improve circulation to the area, helping to reduce swelling pain and bruising perineum and vagina. If a mother has stitches, gentle pelvic floor muscle exercise won't put any strain on them.^[20]

In this regard, there is plenty of scope and potential in the discipline of physiotherapy^[21] to maintain and bring back the fitness of pre and postnatal women. Till date, there are no special applicable guidelines for a profession like sportswomen or working mother. Ideally, the fitness program should be need-based.^[22] This is the era of customized or individualized fitness programs that required for the modern women in respect to their profession.^[23]

Research question

1. Does customized physiotherapeutic intervention improve the fitness of pregnant women?
2. Does exercise during pregnancy help maintain the long-term fitness of women after delivery?

Methodology

The study was conducted in the department of PRM (Physiotherapy) in collaboration with the gynecology department of a tertiary hospital in North India.

The data were collected using an interview schedule which included the demographic profile, fitness problems, obstetric history, and self-copying mechanism to reduce fitness-related health issues suffered by the subjects. The data has been analyzed with the help of latest software and with the help of an experienced statistician. The values of all the variables have been expressed as Mean and Standard Deviation and the *P* value were obtained as applicable. The *P* value has been fixed on 0.05 as standard for all the variables. The study plans were as follows:-

The investigator sourced the subjects from the OBG clinic and Physiotherapy (PRM) department. Pregnant and post-natal participants were asked about various types of problems faced by them. They were also asked about care and precautions taken by them pertaining to fitness during pregnancy and lactation. A proforma was designed for ascertaining these issues.

Scoring was done for existing practices of the respondents (*n* = 174) regarding their posture (sitting/standing/lying) and daily activities (mopping/brooming/doing utensils/washing clothes/picking up thing from the floor). Customized corrections were advised as per the study intervention protocol.

Firstly a booklet was developed in English and then it was translated into Hindi and Punjabi.

A proforma was also given to all the experts to record their evaluation on the following domains/various aspects of the booklet.

- Overview: Titles, Subtitles, Chapters
- Language: Clarity, Jargon, Spellings
- Layout: Diagrams, Flow charts
- Content: Adequacy, Relevance, Sensitivity
- Size: Number of pages
- Suggestions.

Based on the feedback, the final version of the booklet was developed and was distributed among the participants.

It was a Randomized Controlled Trail [Figure 1]. Our sample size was 50 however we included 58 subjects in each group to account for dropouts. The study was conducted in the Physiotherapy department of a tertiary care hospital in North India. Our target population consisted of women in ante and postnatal stage, randomly selected from Obstetrics and Gynecology OPD and it was conducted between 2014-2018. We included women in pre-natal (from 2nd trimester onward) and postnatal stage (till 6 months). We excluded Antenatal and postnatal women who had:-

- Severe Cardiopulmonary disorder,
- Any psychological abnormalities,
- Active vaginal bleeding,
- Any type of infection,
- STD, HIV + women,
- Vaginal fistula,
- 3rd degree onward uterine prolapse,
- Spinal cord injury
- Threatened abortion or recurrent miscarriage,
- Previous premature births or history of early labor.

Our trial was registered in Clinical Trial Registry of India (CTRI) Reg. No. REF/2015/06/009144 and ethical clearance has been taken from PGI ethical committee no. INT/IEC/2015/293.

Intervention package components

Visit schedule of subjects: Visit schedule of the subjects was as follows [Table 1]:-

General education

This session included all the changes that occur during pregnancy, its effects on physiological and mechanical changes in the body

and how to correct it during pregnancy.^[24,25] Patients were given guidelines before engaging in an exercise program. The package had instructions on the methods to do prenatal and postnatal exercises. Information on postural care was also explained.^[21]

Exercises

An introductory session was held by the researcher on the first visit of subjects (pre and post-natal both). It lasted for about 5 to 10 min. All the females (ANC/PNC) were divided into three groups according to the package prepared (mentioned earlier). The exercise session lasted for 20-30 min according to requirements and tolerance of the subjects. There was 5 min warm-up, 10-20 min' exercise session including breathing exercise. It ended with 5 min cool down session.

The warm-up session included a full range of motion (ROM) exercise of both upper limb and lower limb, neck ROM, low and medium speed walking with a breathing exercise.

This session included the training of patients on a set of exercises different for prenatal and postnatal women by the researcher. It was held in Physiotherapy section of Physical Medicine and Rehabilitation Department (PMR), PGIMER, Chandigarh.

Exercises advised in prenatal and postnatal training package were as follows:

- Breathing exercise
- Active foot and ankle exercise
- Stretching exercise of upper and lower limbs
- Adductor stretching (tailor press)
- Strengthening exercise
- Isometric back and abdominal exercise
- Pelvic bridging
- Postural care and ergonomic training
- Cat and camel exercise
- 4-point kneeling with arm lift and leg lift
- Side leg raisers in side lying position
- Isometric exercises of the neck.

Study procedure

An introductory session was held by the researcher on the first visit of pregnant subjects (pre and post-natal both). It lasted for about 10 to 15 min. All the females (ANC/PNC) were

Table 1: Visit schedule

Gestation period	Visit no	Activities related to RCT
12-20 weeks	1	Registration, Group allocation, intervention, Demonstration of exercises as per intervention packages
24-28 weeks	2	Follow-up, retraining, correction of posture etc.
28-32 weeks	3	Follow-up, retraining, postural adjustments & correction, precautions etc.
36- weeks till delivery	4	Follow-up, precautions, concentrate on breathing exercise
Postnatal 1-30 days	5	Follow-up, look after the complications, training according to complications, breathing exercise, pelvic floor muscles exercise
6-12 weeks	6	Training including exercise therapy delivered according to tolerance and improvement of the subject, breathing exercise, generalized stretching and kegel's exercise. Walking as tolerated and massage. Electrotherapy modalities were applied as per requirements.
12-20 weeks& onward	7	Previous exercise with increased timing+low level aerobics and strengthening exercise + Electrotherapy modalities.

randomly divided into three groups according to the package prepared [Table 2].

1. First, an intervention room (IR) was established in the PRM (Physiotherapy) department. Simultaneously researcher enlisted various fitness-related problems of the participants.
2. A referral system was established between Obstetrics and gynecology and PRM departments.
3. Investigator recruited the eligible cases regularly whenever they arrived during working hours.
4. All eligible patients were divided on the basis of complications in respect of physiotherapeutic intervention.
5. Patients who meet the inclusion criteria were randomized into 3 groups i.e., A, B and C using the block randomization method to ensure balanced assignment.
6. Random number table was used for randomization which was done by a faculty member of SPH (School of Public Health), not involved in the study.
7. The participants were assessed again in respect of their health, postural and ergonomic fitness related problems which can be managed and controlled by intervention package. Baseline data were collected (% having symptom/problem). Throughout their OPD visits (for their self-check up and immunization of their children) subjects were asked to visit the physiotherapy department for the administration of their interventions package.
8. The study did not interfere with the pharmacological treatment or any supportive therapy prescribed for the participants by the concerned doctors.
9. The package being administered was finalized in consultation with the doctor concerned as well as with the participants and their caregivers.
10. Participants were encouraged to comply with the instructions pertaining to various components of the intervention package.
11. In therapeutic intervention package, i.e., Group A was provided with the brochure and exercise demonstration and called in the department (Hospital based program) as per the schedule. Group B was provided exercise demonstration and brochure to practice at home (home management program).
12. In the case of Group C, the subjects were received only routine conventional management.
13. Follow-up of all the groups was done as per the enclosed schedule. A reminder was given to patients who did not turn up on a scheduled follow-up visit.
14. Participants were asked to maintain a logbook (a basic exercise chart has been included in the backside of the booklet) to keep a record of the compliance with all the intervention package components including the exercise they performed. Feedback was taken from these log books at each follow-up visit.
15. During the follow-up visit, the patients were asked about the degree of relief about their symptoms.
16. The packages were discussed with the consulting OBG expert time to time or as per requirements.

Results

A total of 174 numbers of participants were included in the study: out of which 156 were ante-natal and 18 are postnatal women.

The Age profile of the subjects

Mean age (in years, Table 3) of Group A was 28.54 ± 4.14 , of Group B, were 27.54 ± 3.18 and Group C were 27.70 ± 3.55 for the ante-natal stage. For the postnatal stage, the means for the three groups e.g., A, B, C were respectively 30.0 ± 6.92 , 30.67 ± 4.18 and 32.0 ± 3.50 (years).

Existing practices of participants to address their fitness problems

Only 51 pregnant subjects made an effort to address their pain and 4 women with postnatal pain by using hot fomentation [Table 4].

Problem wise intervention and the outcomes

Low back pain

No. of patients having low back pain before intervention (baseline) as per their VAS score for three ante and post-natal stages and

Table 2: Intervention protocol

Components of intervention	Group A	Group B	Group C
	Package-I	Package-II	
Booklet (exercise)	Y	Y	Routine care
Exercise demonstration	Y	N	No interventions by the researcher
Dietary advice	Y	Y	
Mobile based feedback	Y	Y	
Postural advice	Y	N	

Table 3: Age profile of the subjects

	Ante-natal (n=156)			Post-natal (n=18)		
	Group A (54)	Group B (52)	Group C (50)	Group A (4)	Group B (6)	Group C (8)
Age (years)						
≤25	20.4	17.3	22.0	25.0	-	-
>26-30	53.7	61.5	64.0	75.0	100.0	12.5
≥31	25.9	21.2	14.0	-	-	87.5
Mean	28.54	27.54	27.70	30.0	30.67	32.0
SD	±4.14	±3.18	±3.55	±6.92	±4.18	±3.50
t test (P 0.05)	Gr. A/Gr.B		0.1622	Gr. A/Gr.B		0.8517
	Gr.A/Gr.C		0.2655	Gr.A/Gr.C		0.6241
	Gr.B/Gr.C		0.8108	Gr.B/Gr.C		0.5438

the probabilities of their comparison by X² test and fisher's exact test mentioned as in Table 5. VAS score was >6 in most of the cases which indicates all of them had pain and the P value was >0.05.

Follow-up data of VAS score of LBP scores profile

Within the group also there was a significant improvement in VAS score of Group A [Table-6].

Follow-up 6 ante-natal stage of LBP

The groups are independent of VAS scores. A significant difference between the three groups (A, B, C) and also three pairs of groups has been found out by using the X² test. All these difference are highly significant.

Table 4: Existing practices of participants to address their fitness problems

Practices	LBP (Low Back Pain)			
	Prenatal		Postnatal	
	n=156	%	n=18	%
Hot fomentation				
Bottle/Hot packs	51	32.48	4	22.22
Electric belt	4	2.54	3	16.66
Massage	33	21.65	1	5.55
Exercise	16	9	1	5.55
Not aware/ignorance	52	33.12	9	50.00

This shows that at the sixth follow-up stage, the effect of the intervention on Group A is significantly more than on Group B and the effect of the intervention on Group B is significantly more than one Group C. It makes this quite clear that the effect of the intervention on Group A is more than that on Group B and is much more than the effect on Group C. From the distribution of sampled subjects in the above three groups, it is very clear that the intervention had been effective in all three groups.

Post-natal LBP

At the sixth follow-up stage, the P values for various pair of groups show that the groups are not significantly different as for as the effect of the intervention on the subject in these groups is concerned. This is mere because the cell frequencies for the various VAS scores were very small; the probabilities have to be found out by summing up the neighboring cell frequencies. From the face of the table, one can easily make up that the effect of the intervention is more on Group A as compare to Group B and Group C.

Its effect in Group A is more than Group B, the effect of the intervention in Group A and Group B is comparatively better than in Group C.

In all the three groups there was highly significant improvement at every follow-up in all the three groups.

Table 5: Baseline VAS scores of low back pain of the subjects

Base line VAS score	Ante-natal (n=150/156)			Post-natal (n=8/18)		
	Group- (51)	Group B (50)	Group C (49)	Group A (3)	Group B (2)	Group C (3)
0	-	-	-		-	
5	-	3	2	1	-	1
6	16	11	16	1	1	1
7	23	21	17	1	-	-
8	11	14	12	-	1	1
9	1	1	2	-	-	-
X ² test				Fisher exact test		
Gr.A/Gr.B/Gr.C				Gr. A/Gr.B, P=0.47619		
P=0.9188				Gr.A/Gr.C, P=0.525		
				Gr.B/Gr.C, P=0.17483		

Table 6: Follow-up data of VAS score of LBP scores profile

Follow-up-6 VAS score	Ante-natal (n=150/156)			Post-natal (n=8/18)		
	Group A (51)	Group B (50)	Group-(49)	Group- (3)	Group- (2)	Group C (3)
0	22	4	5	2	1	-
1	8	15	11	1	-	-
2	3	22	9	-	1	1
3	16	8	6	-	-	1
4	2	1	11	-	-	1
5	-	-	7	-	-	-
X ² test				Fisher exact test		
Gr.A/Gr.B/Gr.C, P=0.0000				Gr. A/Gr.B, P=0.5000		
Gr.A/Gr.B, P=0.000				Gr.A/Gr.C, P=0.175		
Gr.A/Gr.C, P=0.0000				Gr.B/Gr.C, P=0.08159		
Gr.B/Gr.C, P=0.0002						

Presence of leg cramps

Out of the total 174 sampled subjects, 41 were suffering from leg cramps, 37 at the ante-natal stage and remaining four at the post-natal stage. Of the 37 at the ante-natal stage, 14 were in Group A, 17 in Group B and 6 in Group C. of the 4 in postnatal stage 2 were in Group A and remaining 2 in group C. in Group B of the post-natal stage there was no person who had leg cramps [Table 7].

Distribution of the subjects suffering from leg cramps as per VAS score at the baseline stage

At the baseline, the subjects suffering from leg cramps were asked about the seriousness of the problem. It was found that Group A and Group B separately had the same level of problem as Group C, but the problem of Group B was significantly more than Group A [Table 7].

Ante-natal stage leg cramp

At the follow-up 3 stages it the results in Group A and Group B were highly significantly different. It means that Group A subjects have progressed more as compared to the subjects of Group B, the *P* value for the comparison of Group A and C at the 3rd visit is no longer significant. This probably is because of the number of the subject being less in Group C. However from the frequency distribution table it can be clearly seen that Group A, as well as Group B, have improved more as compared to Group C.

The impacts of intervention package are equally effective in case of ante-natal as well as on post-natal subjects. The pain score shifting towards '0' level shows the positive impact of the intervention package.

The ante-natal stage [Table 8] follows up 6: at this stage, Group A was been found to be significantly different from groups-B and

C and also Group B is significantly different from Group C. this shows that at follow-up six-stage the groups which were similar at the baseline or other follow-up stages have become significantly different.

Post-natal stage leg cramp

There being only 4 cases of leg cramps, 2 each in Group A and Group C, it has not been possible to study the effect of the intervention by applying a test and finding out the *P* value. However, the frequency distribution of these subjects against the VAS score for various follow-ups visit shows that the effect of the intervention on Group A is clearly visible [Table 8]. This positive effect of the intervention on Group A is clearly more than Group C where no intervention has been provided.

The table shows that the situation of leg cramps in Group A in the pre-natal stage has significantly improved during FU1 and FU2, FU2 and FU3, FU4 and FU5 and lastly during FU5 and FU6. There has not been a significant improvement during baseline score and FU1, during FU3 and FU4.

In case of Group B, a significant improvement was observed during the period between all the two successive follow-ups. In Group C a significant improvement was observed during the baseline and follows up1. But no such improvement found during subsequent two visits.

Presence of pre-natal and post-natal coccyx pain and their follow-ups from baseline to sixth follow-ups as per VAS score

Out of a total of 174 participants, 36 participants had ante-natal coccyx pain. Out of this 36 participants, 32 were in ante-natal stage, where 10 were in Group A, 12 were in Group B and the

Table 7: Distribution of the subjects suffering from leg cramps as per VAS score at the baseline stage

Baseline VAS score	Ante-natal (n=37)			Post-natal (n=4)		
	Group A (14)	Group B (17)	Group C (06)	Group A (2)	Group B (-)	Group C (2)
6	5	2	1	-	-	-
7	7	7	3	2	-	1
8	1	8	2	-	-	1
9	1	-	-	-	-	-

*X*² test
Gr.A/Gr.B, *P*=0.01223, Gr.A/Gr.C, *P*=0.16048
Gr.B/Gr.C, *P*=0.11146

Comparison not possible as the cell frequencies are very small

Table 8: The Frequency distribution of the subjects suffering from leg cramps at follow-up - 6

Follow-up-6 VAS score	Ante-natal (n=37)			Post-natal (n=4)		
	Group A (14)	Group B (17)	Group C (06)	Group A (2)	Group B (-)	Group C (2)
0	3	-	-	1	-	-
1	5	5	-	1	-	-
2	1	7	-	-	-	-
3	2	4	3	-	-	1
4	1	1	3	-	-	-
5	-	-	-	-	-	1

*X*² test Gr.A/Gr.B, *P*=0.00595, Gr.A/Gr.C, *P*=0.007843, Gr.B/Gr.C, *P*=0.0384

Comparison not possible as the cell frequencies are very small

remaining 10 were in Group C. Similarly out of 18 post-natal subjects only 4 having coccyx pain, 1 each in Group A and Group B and there were 2 in Group C having coccyx pain. They developed the problem after the delivery of their baby. Treatment package was delivered to them and they show the result group-wise as per the table. Group-wise and severity wise problem breakup of the coccyx pain are given in the table at the baseline and six follow-up stages [Table 9]. There was no such improvement found in the early stage of intervention, in case of both ante and post-natal subjects.

Presence of pre-natal coccyx pain (VAS score) follow-up-6

After sixth follow-up there was a significant improvement in Group A and B but not in Group C and *P* value found as follows:-

Group A, *P* = 0.002, Group B, *P* = 0.001, Group C, *P* = 0.102.

The given Table 10, shows the breakup of coccyx pain cases for each group at the ante-natal and post-natal stages. For comparing the group-wise improvement due to the intervention we may have to look at each group at every follow-up stages. We find that at each follow-up stage the participants have been cured of the problem. The rate at which the problem has been cured is faster in Group A than in Group B. The rate has been faster in Group A than Group C also. It can also be seen that cases of Group B have been cured at a better rate than the cases of Group C.

Sacro-iliac joint (SI joint) pain

Out of a total of 174 subjects, 26 subjects had sacroiliac joint (SIJ) pain. Out of this 26 subjects 10 were in Group A. 8 in Group B and the remaining 8 in Group C was having SIJ pain. There were 26 subjects those who were suffering from SIJ pain enrolled in the ante-natal stage. They developed the

problem before the delivery of their baby while their body weight was increasing. Treatment package was delivered to them and they show the resulting group-wise as per the table. group-wise and severity wise problem breakup of the SIJ pain subjects are given below at the baseline and till six follow-up stages.

SIJ pain starting from baseline and till sixth follow-ups were as follows

The maximum number of patients were having pain score >6 in all the 3 groups. Subsequently treatment package were implemented and result were obtained [Table 11].

Presence of pre-natal SIJ pain (VAS score)

Group A and group B had significant improvement, but not in Group C. The difference within the group was significant in Group A and B. There was no significant difference in the improvement between the groups [Table 12].

After the implementation of the intervention package, it is found that the improvement rate was faster in case of Group A as compared to Group B and Group C. The improvement starts showing from the third and fourth visit onward which continues till the sixth follow-up.

Discussion

Having a baby is a wonderful experience for any woman for a good reason, but it is considered to be a fragile time for women. Various fitness-related problems are experienced by them as a result of growing uterus and related changes during pregnancy and after delivery.^[26] These consequences are related to the biomechanical, anatomical, physiological and hormonal changes related to maternity. These changes especially biomechanical

Table 9: Coccyx pain

Baseline (Coccyx pain) (VAS score)	Ante-natal (n=32)			Post-natal (n=4)		
	Group A (10)	Group B (12)	Group C (10)	Group A (1)	Group B (1)	Group C (2)
4	-	-	-	-	-	-
5	1	1	1	-	1	-
6	1	4	3	1	-	-
7	5	5	4	-	-	1
8	2	1	2	-	-	1
9	1	1	-	-	-	-

Table 10: Presence of pre-natal coccyx pain (VAS score) follow-up-6

Follow-up-6 (Coccyx pain) VAS score	Ante-natal (n=32)			Post-natal (n=4)		
	Group A (10)	Group B (12)	Group C (10)	Group A (1)	Group B (1)	Group C (2)
0	5	3	-	-	1	-
1	2	3	-	-	-	-
2	2	4	1	-	-	-
3	1	1	3	1	-	-
4	-	1	3	-	-	1
5	-	-	2	-	-	1
6	-	-	1	-	-	-

Table 11: SIJ pain starting from baseline and till sixth follow-ups were as follows

Baseline (SIJ pain) (VAS score)	Ante-natal (n=26)		
	Group A (10)	Group B (8)	Group C (8)
4	-	-	-
5	-	-	-
6	2	4	2
7	5	2	3
8	2	1	2
9	1	1	1

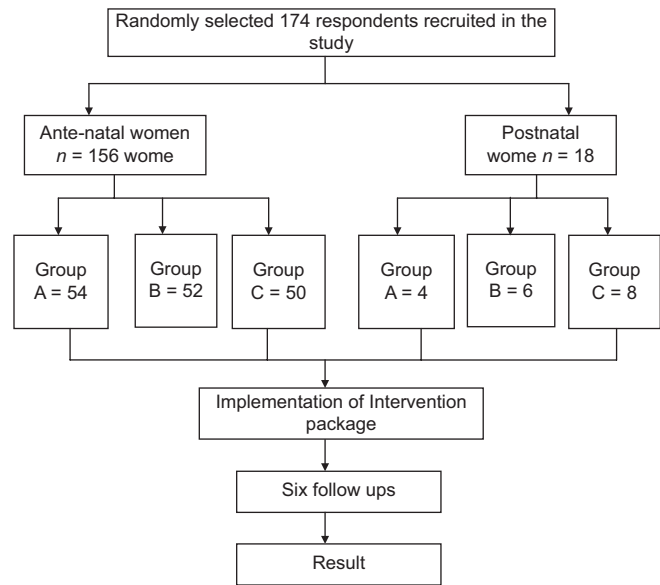
Table 12: Presence of pre-natal SIJ pain (VAS score

Follow-up-6 VAS score	Ante-natal (n=26)		
	Group A (10)	Group B (8)	Group C (8)
0	1	-	-
1	3	1	-
2	3	3	-
3	3	3	1
4	-	1	3
5	-	-	2
6	-	-	1
7	-	-	1

affect the everyday activity of women and impact their productivity. Sequelae of these fitness-related problems during the prenatal and postnatal period may persist for an even longer duration. As a result, these cause chronic morbidity changes.^[27] This affects the quality of life and health of the women in the postpartum period. These fitness problems are exacerbated by the softening of the ligaments and joints of the lumbo-sacral region occasioned by the elevated progesterone and relaxin in pregnancy.^[28] These pregnancy-related problems include overstretching of the rectus abdominus muscles (diastasis recti), carpal tunnel syndrome, bladder problems (urinary incontinence), low and mid back pain, leg cramp, varicose vein, sacroiliac joint (SIJ) pain (+/- sciatica), pubic symphysis pain, piriformis muscle spasm, shifting of the center of gravity postural changes, respiratory distress, tightness in the joints, abdominal bulging (diastasis recti), post cesarean pain (after healing), perineal pain and discomfort, coccydynia, obesity, pelvic organ prolapse (prolapsed uterus), thoracic and rib pain, constipation etc.

Pregnancy-related fitness problems may be the beginning of lifelong chronic problems which may cause considerable disability and distress out of which spinal and pelvic area is the most affected area.^[29] Earlier the focus of the health care planners was on maternal mortality which did not address individual routine maternity-related problems of women. Now we need to give due attention to their morbidity and fitness issue.^[6]

Now a day's most of the women are working during pregnancy.^[30] Various health issues related to pregnancy pose a threat to their fitness and as a result, they have to face problems in their professional life also. Some women are forced to leave or change

**Figure 1: Study design (Flow chart) follow-up**

their profession just because of a lack of fitness or problems related to pregnancy.^[31]

The major hindrance in this regard is that consulting a physiotherapist has not become an 'in thing' for women with fitness-related health problems during the antenatal and postnatal stage. Even there is not much dialogue between OBG expert and physiotherapists till date. They do not get to see physiotherapists as a routine system. In some part of India, the OBG-Physiotherapy collaboration started which started giving services to the pre and postnatal women. But it is available in a few cities only and not for the common people. In the rural area, it is a matter of dream only. Exercise during pregnancy offers many physical and emotional benefits. It boosts mothers' mood by increasing the levels of feel-good chemicals (endorphins) in the brain, helps to lose weight and regain pre-baby figure/pre-pregnant stage, protects from aches and pains, improves strength and stamina which helps to look-after newborn easier and helps to control the bladder and bowel in the antenatal and postnatal stage.^[32]

Physical activity may also help manage some symptoms faced by pregnant women and make them feel better.^[33] Some of the benefits of exercising regularly throughout pregnancy includes enjoyment, more energy, stronger back muscles, which can help to manage back pain and strain as the belly grows, improves posture, circulation, weight control, stress relief, improves sleep, preparation for the physical demands of labor, faster recuperation after labor, faster return to pre-pregnancy fitness and healthy weight and increased ability to cope with the physical demands of motherhood.^[34]

For comparing the group-wise improvement due to the intervention we may have to look at each group at every follow-up stages. We find that at each follow-up stage the subjects have been cured of the problem. The rate at which the problem has

been cured is faster in Group A than in Group B. The rate has been faster in Group A than group--C also. It can also be seen that cases of Group B have been cured at a better rate than the cases of Group C. This improvement was equally in case of both ante and postnatal stages.

It is found that a maximum number of subjects had low back pain in all the groups and in both ante and postnatal stage. After the implementation of the intervention package, there was tremendous improvement or relief from the pain and discomfort which were clearly found until the end of the 6th follow-up. The *P* value shows the significance of the intervention package.

So, here, we can conclude that various types of exercises, postural advice, precautions, maternity belt, massage^[35] and behavioral therapy^[36] used in the trial can reduce and even can achieve complete relief from different types of problems of ante and post-natal women. Gradual decreasing of the percentage of problems in every follow-up in the percentage table indicates the positive impact of intervention package. The most important aspect of this study which was found here that the supervised implementation of intervention packages (for Group A) is most effective to obtained good result from different types of complications during and after pregnancy. These simple exercises can be done in primary health care facilities under the supervision of primary care physicians, which will benefit the antenatal and post-natal mothers in rural areas.

Consent

Taken from the participants.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

- Grant, M. A Short History of Classical Civilization. London: Weidenfeld and Nicolson; 1991.
- Lance C, Dalleck MS, Ien K. The History of Fitness. New Era International; 2002.
- Inanir A, Cakmak B, Hisim Y, Dimirturk F. Evaluation of postural equilibrium and fall risk during pregnancy. *Gait Posture* 2014;39:1122-5.
- Gjerdingen D, Fontaine P, Crow S, McGovern P, Center B, Miner M. Predictors of mothers' postpartum body dissatisfaction. *Women Health* 2009;49:491-504.
- Basavanthappa BT. Essentials of Midwifery and Obstetrical Nursing. 1st ed. Bangalore: Jaypee Brothers Medical Publishers (p) ltd; 2011. p. 130.
- Gupta N. Low back pain after pregnancy in Indian women. *Indian J Res* 2013;3:221-2.
- Maigne JY, Rusakiewicz F, Diouf M. Postpartum coccydynia: A case series study of 53 women. *Eur J Phys Rehabil Med* 2012;48:387-92.
- Laslett M. Evidence - based diagnosis and treatment of the painful sacroiliac joint. *J Man Manip Ther* 2008;16:142-52.
- Zhou K, West HM, Zhang J, Xu L, Li W. Interventions for leg cramps in pregnancy. *Cochrane Database Syst Rev* 2015;11:CD010655.
- Scroder G, Kundt G, Otte M, Wending D, Scober H-C. Impact of pregnancy on back pain and body posture in women. *J Phys Ther Sci* 2016;28:1199-207.
- Snooks SJ, Setchell M, Swash M, Henry MM. Injury to innervations of pelvic floor sphincter musculature in childbirth. *Lancet* 1984;2:546-50.
- Muller RD, Wasserhiet J. The culture of silence, reproductive tract infections among women in the third world. *International women's health coalition*, 1991. p. 1.
- Rao RC, SM Dhanya, K Ashok, SB Niroop. Assessment of cultural beliefs and practices during the postnatal period in a coastal town of south India. A mixed method research study. *Glob J Med Public Health* 2014;3:1-8.
- Howard, D. Aspects of maternal morbidity: The experience of less developed countries. *Adv Intention Maternal Child Health* 1985;7:1-35.
- Dass GS. Reproductive morbidity. *J Indian Med Assoc* 1995;93:55-7.
- ACOG Committee Obstetric Practice. ACOG Committee Opinion, No. 267, Exercise during pregnancy and the postpartum period. *Obstet Gynecol* 2002;99:171-3.
- Chartered Society of Physiotherapy. "History of the Chartered Society of Physiotherapy". Retrieved 29 May 2008.
- Brown JS, Posner SF, Stewart AL. Urge incontinence: New health related quality of life measures. *J Am Geriatr Soc* 1999;47:980-8.
- Casey BM, Schaffer JL, Bloom SL, Heartwell SF, McIntire DD, Leveno KJ. Obstetric antecedents for postpartum pelvic floor dysfunction. *Am J Obstet Gynecol* 2005;192:1655-62.
- Mahishale AV, Maria Vlorica LPA, Patil HS. Effect of postnatal exercise on the quality of immediate postpartum mothers. A clinical trial. *J South Asian Feder Obst Gynae* 2014;6:11-4.
- Sarkar PK, Singh P, Singh A, Dhillon MS, Suri V. *Pregnancy and Motherhood: Safe exercise for Fitness*. ISBN; 978-81-290-019-5.
- Fieril PK, Olsén MF, Glantz A, Larsson M. Experiences of exercise during pregnancy among women who perform regular resistance training: A qualitative study. *Phys Ther* 2014;94:1135-43.
- Fleck SJ, Kraemer WJ. *Designing Resistance Training Programs*. 3rd ed.ampaign, IL: Human Kinetics; 2004.
- Dorr HG, Heller A, Versmold HT. Longitudinal study of progestins, mineralocorticoids and glucocorticoids throughout human pregnancy. *J Clin Endocrinol Metabol* 1989;68:863-8.
- Doran F, Davis K. Factors that influence physical activity for pregnant and postpartum women and implications for primary care. *Aust J Prim Health* 2011;17:79-85.
- Shrock P. *Glob Libr. Women's Med*. ISSN: 1756-2228: 2008. doi: 10.3843/GLOWM.10098.
- Albert HB, Godskesen M, Westergaard JG. Incidence of four syndromes of pregnancy-related pelvic joint pain. *Spine* 2002;27:2831-4.

28. Ostgaard HC, Zetharstrom G, Roos E, Svanberg B. Reduction of back and posterior pelvic pain in pregnancy. *Spine (Phila Pa 1976)* 1994;19:894-900.
29. Clap JF. Exercise during pregnancy. A clinical update. *Clin Sports Med* 2000;19:273-86.
30. Salihi HM, Myers J, August EM. Pregnancy in work place. *Occup Med* 2012;62:88-97.
31. Dunning K, LeMasters G, Levin L, Bhattacherya A, Alterman T, Lordo K. Falls in workers during pregnancy: Risk factors, job hazards, and high risk occupations. *Am J Ind Med* 2003;44:664-72.
32. Richards E, VanKessel G, Virgara R, Harris P. Does antenatal physical therapy for pregnant women with low back pain or pelvic pain improve functional outcomes? A systematic review. *Acta Obstet Gynecol Scand* 2012;91:1038-45.
33. Hatch MC, Shu XO, McLean DE, Levin B, Begg M, Reuss L, *et al.* Maternal exercise during pregnancy, physical fitness, and foetal growth. *Am J Epidemiol* 1993;137:1105-14.
34. Artal R. Exercise during pregnancy: Safe and beneficial for most. *Physician Sports Med* 1999;27:51-75.
35. Field T. Pregnancy and labor massage. *Expert Rev Obstet Gynecol* 2010;5:177-81.
36. Singh AJ. DBT project on 'feasibility of behaviour therapy for urinary incontinence in a hospital setting' 2010-2012.