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Perceptions, attitudes and beliefs on antenatal exercises among primiparous pregnant women: a qualitative study in Sri Lanka

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ABSTRACT

Background Even if promoting antenatal exercises is an evolving concept worldwide, there is a scarcity of qualitative exploratory studies which directly focus on pregnant mothers' views about exercises. So, this study was designed to (1) explore pregnant women's perceptions, attitudes and beliefs about antenatal exercises, and (2) provide significant annotations prior to constituting interventions for antenatal exercises.

Methods A qualitative survey was carried out with 19 primiparous pregnant women using stratified purposive sampling at the antenatal clinic, in a tertiary care hospital, Sri Lanka. In-depth interviews were conducted through a predesigned, semistructured interview guide from January to April 2021. Data were transcribed, examined and organised, then subjected to thematic analysis using inductive approach.

Results Most of the pregnant women described numerous benefits and had optimistic views on exercises. However, the absence of a comprehensive understanding on the impact of exercise on a healthy pregnancy is apparent, primarily caused by a dearth of health education and reliable information sources. Also, they were unlikely to initiate exercises in their pregnancy period due to a lack of guidance through the antenatal clinic and/or health professionals. Concerning beliefs, main stream-believed exercises provide assistance for normal labour process and exercises advantageous in both antenatal and post-partum periods. Besides, few of them restricted their conversations on the drawbacks of exercises by illuminating erroneous beliefs.

Conclusions The majority of participants realised the importance of exercises and had positive attitudes while the minority presenting misconceptions. The need for healthcare providers' support and guidance is highly anticipated by pregnant women to engage in antenatal exercises.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ Only primiparous mothers were involved from the antenatal clinic in one of the major tertiary care centres in the country.
⇒ Qualitative research design was employed since it has not been used previously in this context on exploring antenatal mothers' views.
⇒ Impartiality of the obtaining data from each participant was assured by Interview guide when collecting data through in-depth interviews.

INTRODUCTION

Physical activity (PA) is defined as any voluntary body movement produced by the contraction of skeletal muscles which require energy expenditure.[1] Physical exercise can be described as a subcategory of PA that is intentional, structured, repetitive and purposeful actions which are performed for improving and preserving physical fitness.[2] Antenatal exercise, which refers to exercise that women perform during pregnancy, is a crucial component of prenatal care that aids to promote the health of both the mother and baby.[3]

Physical exercises performed since the very beginning of pregnancy have a positive effect on the growth of the placenta, its surface area and the number of its blood vessels.[4] Performing regular exercise throughout the pregnancy is also advantageous to improve physical condition,[4–7] to provide well-being,[8] to improve body image,[9 10] to reduce maternal weight gain[10–13] and to reduce the musculoskeletal complaints associated with pregnancy.[12 14 15] Antenatal exercises also help to improve mood and diminish the risk of postpartum depression.[16] It assists to fetal growth and development and reduces the risk of preterm birth.[17] Furthermore, regular exercise advances the baby's brain development and cognitive functions.[18] Hence, it is suggested that women with uncomplicated pregnancies should be engaged in aerobic and strength condition exercises before, during and after the pregnancy.[19]

The latest report on PA and sedentary behaviour which was issued by the WHO[20] prescribed that pregnant mothers should engage at least 150 min of moderate-intensity aerobic PA throughout the week. Also, it is instructed to incorporate a variety of aerobic, muscle strengthening and gentle stretching activities. Furthermore, replacing sedentary activity with PA of any intensity (including light intensity) is strongly emphasised to limit the time spent being sedentary during the pregnancy period. Parallel with the international recommendations, 'Technical Report on Physical Activity and Sedentary Behavioral Guidelines for Sri Lankans' also presents a similar exercise guideline for pregnant mothers.[21]

Recent research studies revealed that only 11%–26% of the pregnant population met the current recommendation for exercise in pregnancy.[22 23] There are a wide range of barriers to exercises including both internal (physical/psychological) and external (work, family, time and environmental). Therefore, detecting assistances and barriers to perform exercises is worthwhile for planning effective antenatal exercise courses. Also, it is revealed that lack of access to reliable information, advice and support are major obstacles to engage in exercises during pregnancy.[24] So, obstetric care providers should encourage pregnant mothers to continue or initiate safe exercise to ensure optimal health and well-being during pregnancy.[25 26] It could be achieved through structured personalised programmes which are organised for pregnant mothers based on their current situation, previous experience and current health status.[27]

Furthermore, the literature suggests that even recognised active pregnant mothers are less likely to realise the appropriateness and practicability of antenatal exercises related to lack of information, sociocultural customs and insecurity.[28] Thus, early counselling incorporated with educational sessions which focus on the benefits of the antenatal exercises appears to be fundamentally important.

Preceding to schedule structured programmes, exploring pregnant women's views is crucial for examining their perceptions and beliefs about antenatal exercises. This could be well accomplished through a qualitative research approach, as it will provide a more comprehensive basis for understanding the realistic vision of pregnant mothers about exercises.[29] However, there was a paucity of qualitative research evidence in the literature to understand the views and insights on antenatal exercises among pregnant women. So, this study was aimed at exploring pregnant women's perceptions, attitudes and beliefs on performing antenatal exercises using a qualitative approach in order to facilitate a factual base for underpinning exercise interventions in the clinical setup.

METHODS

This study was carried out at the antenatal clinic of the Teaching Hospital Peradeniya, a major tertiary care centre in the Central province of Sri Lanka from January 2021 to April 2021. The antenatal clinic provides entitled maternity care since the first notice of pregnancy to the delivery through the number of clinic visits which was assigned based on expectant mothers' health requirements. Majority of the participant mothers in the setting are below 30 years of age and have prepregnancy BMI≤30 kg/m^2 according to the hospital statistics reports. Only 2%–8% obese mothers were reported during last 5 years.

Patient and public involvement to reporting

None.

Participants

Sinhala-speaking primiparous pregnant women who had a singleton pregnancy had prepregnancy BMI≤30 kg/m^2, between the ages of 20 and 30 years were included in this study. This age category was selected since common participation and culturally accepted reproductive age range in the context. Obese pregnant mothers' views, beliefs and attitudes may be significantly distinct when compared with others. Pregnant women who had complications during the present pregnancy and were previously prescribed activity restrictions or limitations were excluded.

Data collection

The number of participants recruited for this study was determined by 'theme saturation'. Theme saturation is defined as the point at which 'additional data do not lead to any new emergent themes'.[30] In-depth interviews were conducted with pregnant women from each group of primiparous pregnant mothers who were in first trimester (n_1=6), second trimester (n_2=6) and third trimester (n_3=7) until reached theme saturation. A total of 19 interviews were conducted. A stratified purposive sampling technique was used to select participants in order to include women of different ethnic backgrounds and different gestational ages. Basically, consented participants were divided into first, second and third trimesters of pregnancy as strata, and then selected at least one participant from each ethnic group and religion based on the reported population statistics in the setting.

Data were collected over a predesigned semistructured interview guide to explore their insights on antenatal exercises using a flexible and responsive approach. The interview guide assured that the same range of matters was conferred with each participant mother. The interview guide which composed of mainly six open-ended questions focused on the pregnant women's views, attitudes and beliefs about antenatal exercises. It consists of questions on their personal opinion, awareness on risks and benefits, certain influences, changes when pregnant, persona beliefs, family beliefs and personal/family preference in engage in antenatal exercises with predesigned probes. The sociodemographic characteristics

of the participants were obtained using a predesigned interviewer-administered questionnaire.

Procedure

After providing a detailed explanation about the aims, objectives and procedure of the study, participants' written informed consent was obtained before the interviews. The principal investigator (female) who had training in qualitative data collection carried out all the sessions in a quiet area in the clinic setting. In-depth interviews were conducted using a one-to-one interview method with expectant mothers and one interview session took approximately 45 min to 1 hour. All interview sessions were audio recorded and all necessary details/points were noted down on a script during the sessions by the interviewer. Data collection processes were carried out along with the thematic analysis. Data saturation was accomplished at the 17th interview, and further two interviews were conducted and analysed. No new themes were generated from them and then confirmed final thematic framework. Interview transcripts were assigned Arabic numbers from 1 to 19 serially according to ascending gestational age. Verbatim quotes of the participants were labelled in terms of the assigned serial number, their current trimester and ethnicity.

Data analysis

All collected qualitative data were transcribed and then examined, coded and organised according to the recurrent themes by two assessors independently (principal investigator and another investigator) using a thematic analysis method through an inductive approach. Then, a preliminary thematic framework was developed, and a comprehensive analysis was done. Afterwards, formulated themes and subthemes were examined for similarities and differences between two assessors. Some different themes were identified. Discussions were carried out regarding these facts by assessors and then final themes were confirmed.

Ethical considerations

Ethical approval was obtained from the Ethics Review Committee, Faculty of Medicine, University of Peradeniya (protocol no. 2019/EC/16). Permission was obtained from the Director, Teaching Hospital, Peradeniya (THP/Planning/Approval research/02/2019) and from consultant obstetrician, antenatal clinic, Teaching Hospital, Peradeniya preceding the study. Written informed consent was obtained from orally consented participants prior to all interviews after giving a thorough explanation about the study. Confidentiality and security of all collected data was strictly maintained.

RESULTS

Among the total study sample (n=19), 31.5%, 31.5% and 37% of pregnant women were in their first, second and third trimester, respectively (table 1). Qualitative findings are presented in this paper under two major sections: (1) pregnant women's perceptions, attitudes on performing antenatal exercises and (2) pregnant women's beliefs regarding exercises during pregnancy.

Table 1 Participants' characteristics

	Total (n=19)	
Category	**N**	**Percentage (%)**
Trimester		
First	6	31.5
Second	6	31.5
Third	7	37
Religion		
Buddhist	15	74
Catholic/Christian	4	26
Ethnicity		
Sinhala	16	84
Tamil	1	5.5
Burger	2	10.5
Age (years)		
20<25	11	58
26<30	8	42
Highest level of education		
Ordinary level	4	21
Advanced level	7	37
Diploma	4	21
Degree	4	21
Employment		
Employed	7	37
Unemployed	12	63
Monthly household income (Rs.)		
<40 000	3	16
40 000–100 000	12	63
>100 000	4	21
Family type		
Nuclear	9	47
Extended	10	53
Living area		
Urban	4	21
Semiurban	9	47
Rural	6	32

1. Pregnant mothers' perceptions and attitudes on performing antenatal exercises

Based on pregnant mothers' views, four principal themes and interrelated subthemes were elicited from the perceptions and attitudes on performing exercises during pregnancy (table 2).

The majority of participant mothers (11) broadly described the benefits of antenatal exercises, while

Table 2 Themes and subthemes for pregnant mothers' perceptions on performing antenatal exercises

No	Subthemes	Themes
1	Help to maintain the health and well-being of the mother	Antenatal exercises are advantageous
2	Strengthening bones and muscles	
3	Help for reduction of stress and discomfort of the mother	
4	Provide flexibility and strength in normal labour process	
5	Exercises are essential for a healthy pregnancy	
6	Useful for growth and development of the fetus	
7	Exercises make adverse effects on the fetus	Engaging in exercises is not appropriate during pregnancy
8	Exercises are risky during pregnancy	
9	Fear to do exercises	Lack of motivation for engage in exercises
10	Feeling tiredness and discomfort with increased body weight	
11	No willingness to do	
12	Exercises are fitting only for healthy pregnant mothers	Restrictions attached with the antenatal exercises
13	Exercise should be done under medical supervision	

others (8) presented its drawbacks and limitations. Basically, among the advantages which were stated by them, common eminent facts were only mentioned instead of explaining specific health-related benefits.

Help to maintain the health and well-being of mothers was the most commonly cited (10) view among them and screened as first subtheme.

> As we know exercises are important to maintain our health, I think doing exercises in pregnancy also offers benefits to us, specially, it may help us to keep healthier pregnancy, and may help to ignore difficulties that arise during the period, also I heard in a TV program about this, they said that well-being in pregnancy can be ensured, if mothers can do some suitable exercises according to the number of weeks to get numerous advantages. (Woman no. 4, first trimester, Sinhala)

Number of mothers (9) concerned with *Strengthening bones and muscles* as a good outcome from exercises during pregnancy.

> According to the way I think exercises give some strength to muscle and bones, then, it helps to make the capability of doing works with better weight-bearing, if we perform, can be active as pre-pregnancy, by gaining energy & feeling physical fitness to our bones & muscles. (Woman no. 10, second trimester, Sinhala)

Some expectant mothers (5) further explained that performing exercises in pregnancy *helps for the reduction of stress and discomfort*, so this was defined as the third subtheme under the main reflective view.

> In my point of view, doing exercises could reduce difficulties, and worries in pregnancy, also it provides some relaxation in both of our body and mind, so it gives comfort & relief at this stressful condition. I think it is the major benefit. (Woman no. 19, third trimester, Sinhala, 23 years)

'Provide flexibility and strength in normal labour process' is derived as fourth subtheme out of five mothers' concerns. As an example, one pregnant mother said that,

> I think if we perform exercises in pregnancy period, it will make our body flexible, it will provide good strength and fitness, therefore, it will be very beneficial especially at the time of normal delivery, I heard, if we do exercise, without much struggling, baby will come out with no trouble, delivery duration will be reduced in the labor room. (Woman no. 7, second trimester, Tamil)

Some pregnant mothers (3) expressed that exercises are essential for being healthy. Through their views, *exercises are essential for a healthy pregnancy* is derived as the fifth subtheme.

> I think we need to engage in exercises in pregnancy obligatory, we have to do some selected and appropriate exercises to get number of benefits, thereby managing and handling discomfort, stress and also deal with labor, therefore, it is necessary, I heard that, although we don't do exercises, in abroad pregnant ladies do exercises, because, we are not advised or supported to engage in exercises in pregnancy period. Midwife Ms., or doctor usually, do not give any explanation about suitable exercises. (Woman no. 5, first trimester, Sinhala)

Some of them (5) identified exercises as *useful for the growth and development of the fetus*. So, it can be specified as another subtheme.

> I have seen in a TV program, that performing some exercises in pregnancy period, it helps a lot to fetus to grow, they said that it is good for the development of organs and blood circulation, baby movements, kicks, mental growth such as. So, I think exercises are very beneficial. (Woman no. 11, second trimester, Burger)

According to the above specified views, 'antenatal exercises are advantageous' was drawn as the first main theme. Although participants realised the importance of exercises, insufficient knowledge was an apparent feature among the study sample. All the pregnant women did not have a clear, comprehensive understanding of the impact of exercises on a healthy pregnancy. Furthermore, none of the participants articulate the idea about the role of antenatal exercises in gestational weight gain,

cardio-respiratory health and complicated pregnancy (Gestational DM, Pre-eclampsia).

Even if participants had optimistic insight and positive attitudes about exercises, they usually did not have a tendency to do exercises during their pregnancy period due to certain barriers. Yet, they have heard about the requirement of antenatal exercises through mass media, but they were not received proper direction from the antenatal clinic or health professionals.

While the majority of mothers clarified the advantages and necessity of PA, few women (3) had contrasting views and perceptions.

One woman expressed her ideas 'I think doing exercises is not good at all, we should be very careful, if we do exercises with bending, stretching or expending more energy, it will badly influence to growing baby who is in the womb, sometimes may result in abortions also' (Woman no. 14, third trimester, Sinhala) for example. Thus, *exercises make adverse effects on fetus* derived as the seventh subtheme.

Furthermore, 'exercises are risky during pregnancy' was revealed as another drawback and pointed out here as the eighth subtheme. For instance, one mother said,

> Pregnancy is a risk condition, if we do exercise in this period, it will increase the risk furthermore … because, we don't know what happens to us from exercises, also, this time is not suitable for test anything. (Woman no. 8, second trimester, Sinhala)

On their verbalisations, the second theme was constructed as *exercises are not suitable during pregnancy*.

When discussing preferences on antenatal exercises, some mothers elaborated about their insufficient enthusiasm to perform them during pregnancy due to several causes. Among mothers, six of them stated about fear where, *fear to do exercises* was elicited as the ninth subtheme based on their views. For example,

> I am afraid of engage any exercise, because we don't know how exercise influences to our body and especially for the baby, therefore, I don't like to do things such. May be unsafe. (Woman no. 2, first trimester, Burger)

'Feeling tiredness and discomfort with increased body weight' was identified as the 10th subtheme based on mothers' (4) explanation about physical difficulties that may prevent them from exercising.

> Ah ms., I don't like, because, I feel more tiredness after doing even small works. So, couldn't do extra things with this weight & size of my body, it may be very difficult. (Woman no.17, third trimester, Sinhala)

'No willingness to do' was recognised as the 11th subtheme based on mothers' (3) verbalisation about their loss of interest or eagerness. As an example,

> Actually, I don't feel like exercising, no thoughts about, with this situation, feeling no need of doing such things by expending energy. (Woman no. 11, second trimester, Burger).

Lack of motivation for engage in exercises is derived as the third theme through their perceptions of the above three subthemes.

As next subtheme *exercises are appropriate only for healthy pregnant mothers* was elicited based on mothers' perceptions (5), one of them described as follows for example.

> According to my point of view, exercises are good for healthy expectant mothers, it is not appropriate for mothers who present with high blood pressure, diabetes, and high cholesterol. (Woman no. 9, second trimester, Sinhala)

Exercise should be done under medical supervision was elicited as the last subtheme under this section according to two mothers' opinions, for example,

> I think if we do exercises, definitely should be done with counseling and supervision of VOG doctor, otherwise troubles will arise. In our clinic setting, no services like that. (Woman no. 1, first trimester, Sinhala)

Through the above two subthemes. It can be merged with the fourth main theme 'Restrictions attached with antenatal exercises'.

So, it is obvious that a substantial percentage of participants endorsed misconceptions and conflicting views on antenatal exercises mainly due to knowledge deficit. Certain gaps in knowledge and societal myths could be detected through these observations. Analytically, it is clear that lack of proper guidance and support, inadequate information sources and not receiving appropriate stimulation by healthcare providers were frequently acknowledged as potential barriers to prevent them from exercise, while pregnancy-related discomfort is another specified significant issue.

2. Pregnant mothers' beliefs regarding exercises during pregnancy

In the study sample, the majority of pregnant women (13) expressed their positive beliefs on antenatal exercises among some prominent misconceptions. Basically, nine themes were derived through their opinions and grouped into five categories as follows (table 3).

Positive beliefs on normal delivery

Through their verbalisations (8), it is identified that *exercises provide assistance for normal labour process* as a most prevalent belief among them and stated as the first theme. One woman said,

> Our family belief regarding this is 'PA & exercises give strength, power in a normal delivery with more flexibility. I also, believe that, I can face the normal delivery with adequate energy, strength and good mentality if I perform exercises". (Woman no. 3, first trimester, Sinhala) for example.

Table 3 Themes and categories for pregnant mothers' beliefs regarding exercises during pregnancy

No	Themes	Category
1	Exercises provide assistance for normal labour process	Positive beliefs on exercises in normal delivery
2	Pregnant woman who does exercises can go for a normal labour	
3	Facilitate for early postpartum recovery	Positive beliefs on exercises in the postpartum period
4	Support for adaptation of normal day-to-day activities after delivery	
5	Exercises help baby to being active	Positive beliefs on exercises in new born baby
6	If the mother perform exercises in pregnancy, the baby will adapt to environment well after delivery	
7	Exercises are useful for legs, hands and back	Positive beliefs on benefits and exercise type
8	Walking is good exercise at the last stage of pregnancy	
9	Exercises are not good in the first 3 months of pregnancy	Negative beliefs and misconceptions on exercises
10	Doing continuous exercises may negatively effects on fetal movements	
11	Doing exercises at term may lead to premature labour	

Pregnant woman who does exercises can go for a normal labour was a prevalent belief among prenatal mothers (7) and identified as the second key theme. It was well noted by their verbalisations such as a mother said 'A woman who does physical activities, works, and exercises can deliver a baby by normal labour process. Otherwise, they face caesarean section to deliver their baby' (Woman no. 12, second trimester, Sinhala) for instance.

Positive beliefs on postpartum recovery

Facilitate for early postpartum recovery was elucidated as the third theme based on their views (8). As an example, one mother said 'Actually, I believe that, if we do household work & exercises, we can come back to normal after labor rapidly, maybe a better help for difficulties such as back pain, leg pain, discomfort' (Woman no. 10, second trimester, Sinhala).

The fourth major theme emerged as 'Support for adaptation of normal day-to-day activities after delivery' according to mothers' explanations (5). One of them said,

> Our family, that is to say, my mother, mother-in-law, and elder sister believe that, if we do household tasks on our own, especially do exercises during the pregnancy, we can adapt to living and baby care activities after delivery easily with better capability & strength. (Woman no. 18, third trimester, Sinhala).

Positive beliefs on newborn baby

'Exercises help baby to be active' was derived as the fifth main theme and presented below with an example according to six mothers' verbalisations.

> I think being physically active in this period, may help our baby to being active in the womb too. (Woman no. 6, first trimester, Sinhala)

If the mother perform exercises in pregnancy, the baby will adapt to the environment well after delivery was derived as the next theme based on mothers' concerns (04) and presented below with an example.

> Usually, there is a belief among us that, if we follow daily routines and exercises without laziness in the pregnancy period, then our baby may adapt to the environment well soon after delivery, they will suck well, easily familiarize to the usual setting without any trouble, I also like to do light exercises, but feels fear. If midwife supports and advises, then can-do exercises. (Woman no. 7, second trimester, Tamil).

Positive beliefs on benefits and exercise type

A number of pregnant mothers (7) also believed that 'Exercises are useful for legs, hands and back'. Therefore, this theme was presented here as the seventh key theme and it can be well defined through their opinions such as 'I think if we do exercises, need to choose activities, especially for legs, hands and back, to gain advantageous in this period, my belief is, doing exercises for these sites may reduce pain and discomfort. Further makes good strength and fitness' (Woman no. 9, second trimester, Sinhala) for example.

They expressed their ideas on walking as a mostly practising exercise. On their speeches (11), *walking is good exercise at the last stage of pregnancy* was elicited as the next theme

> Midwife ms & doctor usually advise to walk more in the last stages of pregnancy, we believe it facilitates normal labor and gives benefits to the body. (Woman no.19, third trimester, Sinhala)

Even though, participants relatively perceive constructive opinions on antenatal exercises, most of the presented facts were not grounded in their knowledge and acquired information. Antenatal exercise-related social interpretations, family beliefs and peer concerns appeared as influences which generate pregnant mothers' perceptions and beliefs. Also, pregnant women express the necessity of midwives' assistance and supervision to carry out exercises.

Negative beliefs and misconceptions on exercises

Some of women (3) strongly trust that *exercises are not good in the first 3 months of pregnancy*. So, this theme is identified as a ninth theme and it can be demonstrated by for instance, a woman said 'We believe that exercises are not good at all in the first 3 months of gestation, because

it may cause harm to the baby' (Woman no. 15, third trimester, Sinhala).

Two expectant mothers verbalised that, no baby's head turning/movements happen, if the mother does the same activity in the same position continuously. So, *doing continuous exercises may negatively effects on fetal movements* was recognised as the 10th theme which can be evidenced by a mother said 'My mother always reminds me to prevent continuous activities in same position, because she believes that, if we do the same activity for a long time, spontaneous baby turning will not happen like that…' (Woman no. 5, first trimester, Sinhala) for example.

Doing exercises at term may lead to premature labour was presented as the last theme and only based on one mother's opinion. The part of that verbatim quote is mentioned below.

> My mother-in-law believes that doing activities or exercises in last week's cause pushing baby's head down then, open labor passage early to due date leading to the labor process, therefore it may be a big problem for the baby specially. (Woman no. 13, third trimester Sinhala)

So, it is evident that numerous misconceptions and fallacies which exist among the study sample due to control or negative beliefs of their family and undesirable peers' attitudes.

DISCUSSION

Through the present study, it is distinctly recognised that the majority of primiparous mothers expressed the benefits of antenatal exercises and they had positive attitudes while few of them verbalised objective intuitions to exercises. These themes correspond with the qualitative research on the beliefs regarding antenatal exercises among black South African women[31] and they found that even though the majority of women believed that PA and exercises were beneficial, it is not in the practice due to pregnancy-related discomforts, lack of time, money and related health education. Although the majority of mothers realised the importance of exercises during pregnancy, they had inadequate knowledge about the exercises similarly in previous qualitative study findings among over weight/obese pregnant women[32 33] by indicating the requirement of voluntarily available reliable information sources for pregnant mothers. Among less knowledgeable areas, function of exercise for required weight gain during pregnancy, better cardio-respiratory health and for complicated pregnancies were observed similarly in earlier qualitative research done in Sweden.[34] These gaps may be due to less exposure to educational sessions and exercise interventions during the pregnancy period in a local setting.

Furthermore, another qualitative survey which was done among Latin women[35] found similar themes regarding beliefs in exercises, highlighting that they are important to maintain fitness in pregnancy and motherhood, engaging in exercises should be with caution, as elicited through the present study. Moreover, some misconceptions and myths regarding antenatal exercises were detected in this study and the results are comparable with previously published literature.[31 36] It seems that lack of consistent information and the least public awareness about exercises may possibly cause some social myths resulting in these embedded misunderstandings among pregnant women.

Clinical implications

Through the present study, certain barriers to engaging in exercises were screened out as knowledge deficit, insufficient guidance and support from health professionals and pregnancy-related difficulties similar in earlier published studies,[32 33] which included both internal and external barriers. The absence of scheduled clinical guidelines for exercises in the local healthcare setting and healthcare providers' dearth of intention (especially midwives) to encourage pregnant women to antenatal exercises remained potential significant factors in the studied context.

Specific attention on antenatal exercises should be made among primary healthcare settings by empowering healthcare providers with sufficient training sessions to initiate exercise interventions. Along with that public awareness should be increased through health conferences, discussions and speeches using mass media communication to emerge community focus on antenatal exercises.

Misconceptions and knowledge deficits might be diminished through educational programmes while empowering mothers with sufficient knowledge, skills, positive attitudes and self-motivation for exercise. Furthermore, the impact of the exercises in pregnancy needs to be stressed in the early pregnancy period.[35] Since numerous negative attitudes and misunderstandings were formed due to a lack of appropriate information about antenatal exercises, it can be suggested providing adequate information and disseminating knowledge about exercises through midwives as a practicable approach. This could be well accomplished by numerous collective functions such as offering proper training for midwives, delegating responsibility to care of exercising mothers and to motivate non-exercising mothers and frequent reviewing the practices.

Strengths

Data collection of this survey was completely done by the principal investigator, placing participant mothers in a very comfortable and open situation with rapport and assurance to explore their insights freely. The investigator stressed that there were no right or wrong answers and was only interested in the mothers' own ideas, attitudes and beliefs at the commencement of each interview. Furthermore, the interview guide secured the validity of collected data which was laid out in a similar capacity for each interviewee. Theme saturation was ensured with two final interview sessions afterwards data achieved saturation. Also, two independent assessors derived a thematic framework from transcribed data and

the number of steps followed to generate the final themes of the study. This enhanced the validity and reliability of the findings. Moreover, the key findings of this study were in line with previously published literature. Accordingly, it ensures confidentiality and supports evidence for the validity of findings.

Limitations

We enrolled only primiparous mothers who had prepregnancy BMI≤30 kg/m^2 and in the age range of 20–30 years. It would be better if we recruited pregnant mothers with varying age and BMI ranges without specifying parity, as the study provides a deeper comprehensive insight into the subject with a wide range of different aspects based on parity, high maternal age and obese BMI category. Another potential limitation was that the study participants were enrolled from the antenatal clinic in only one of the tertiary care hospitals in the country. Consequently, the results could be only interpreted in relation to this context and generalisability is limited. If the representative sample could be taken by multistage sampling from all provinces in the country, then generalisability of the results could be ensured.

Conclusions

Based on the results, it can be concluded that the majority of participants had positive attitudes and understood the importance of antenatal exercises. But, stated advantages were constructed majorly on communal information rather than health-related knowledge. Numerous misconceptions were also prominent due to insufficient knowledge and a lack of reliable information. Walking was the only prevalent and well-known exercise which was mentioned as appropriate for all over the pregnancy period by antenatal mothers.

Non-exposure to exercise-related interventions at clinical visits, the lean intention of health professionals regarding antenatal exercises and insufficient public awareness of antenatal exercises also significantly impacted on participants' erroneous judgements on exercises. In particular, midwives' support was recognised as a key factor in continuing antenatal exercises and it was highly expected by pregnant women.

So, structured education programmes incorporated with antenatal exercise interventions during clinical visits are highly recommended. Therefore, developing a protocol that consists of necessary antenatal exercises, sufficient information and practical knowledge with the inclusion of significant midwives' contributions could be suggested. Furthermore, it is recommended to extend future research to explore midwives' knowledge, attitudes and primary healthcare settings' readiness to implement antenatal exercise regimens through qualitative design.

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Contributors SNC participated in designing the study, data collection procedure, statistical analysis and writing the manuscript. RC participated in designing the study, data collection procedure and revising the manuscript. DIN and AR participated in designing the study, interpreting results and revising the manuscript. SUBT participated in designing the study, statistical analysis and interpreting results. SNC accepts full responsibility for the finished work and/or the conduct of the study, has access to the data and controls the decision to publish.

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Patient consent for publication Consent obtained directly from patient(s).

Ethics approval This study involves human participants and was approved by Ethics Review Committee, Faculty of Medicine, University of Peradeniya 2019/EC/16. Participants gave informed consent to participate in the study before taking part.

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Data availability statement All data relevant to the study are included in the article or uploaded as supplementary information.

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