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Prenatal gymnastics and psychological support benefit pregnant women

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Ethics Committee Approval
The study was approved by School of Public Health of the Faculty of Medicine of the University of Kinshasa (date and number: September 17, 2019). All procedures in this study involving human participants were performed in accordance with the 1964 Helsinki Declaration and its later amendments.

Conflict of Interest
No conflict of interest was declared by the authors.

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Abstract

Background/Aim: The management of pregnant women is a significant public health concern. This study aims to demonstrate the benefits of prenatal gymnastics and psychological support on pain, walking, anxiety, and self-esteem during pregnancy.
Methods: A quasi-experimental study was conducted over eight months, from September 2020 to April 2021, with 38 pregnant women participating. They underwent 16 sessions of prenatal gymnastics and psychological support once a week, lasting 45 min at low to moderate intensity. Pain, six-minute walk, anxiety, and self-esteem were measured using the visual analog scale (VAS), the six-minute walk test, the Hospital Anxiety and Depression Scale (HAD Scale), and the Rosenberg scale, respectively. The parametric Student's t-test and chi-square were used to compare quantitative and qualitative variables before and after the program, with $P<0.05$ considered statistically significant.
Results: The study found that the distance traveled (377.45 m vs. 393 m; $P=0.001$) and VO2max (15.1 ml/kg/m^2 vs. 18.5 ml/kg/m^2; $P=0.001$) increased at the end of the program. However, pain (6 vs. 1.16; $P=0.001$) and walking speed (2.2 m/s vs. 1.9 m/s; $P=0.001$) decreased. The program also improved self-esteem (low: 55.3% before vs. 0% after; $P=0.001$, medium: 44.7% before vs. 13.2% after; $P=0.001$, strong: 0% before vs. 86.8% after; $P=0.001$) and anxiety (Uncertain anxiety: 31.6% before vs. 97.4% after; $P=0.001$, Questionable anxiety: 50% before vs. 2.6% after, Certain anxiety: 18.4% before vs. 0% after; $P=0.001$).
Conclusion: Regular prenatal gymnastics and psychological support positively affect oxygen consumption, pain, anxiety, and self-esteem among pregnant women. This program should be provided continuously to minimize pregnancy-related complications.

Keywords: prenatal gymnastics, psychological support, pain, walking, anxiety, self-esteem

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Introduction

Lumbo-pelvic pain is frequently mentioned by women during pregnancy [1] and typically worsens as the pregnancy progresses. As the baby grows, the body must adapt quickly to the new stress created on its ligaments, joints, muscles, and bones [2]. Pain occurs when the body can no longer adapt to the stress placed upon it. The pain may be due to muscle weakness, an asymmetry in the body, a problem with lumbopelvic stabilization, and many other sources or factors. Worsening pain can affect well-being, daily activities and sleep [3].

Finally, the baby's weight brings the center of mass more anteriorly, causing fatigue and potential weakness in the intervertebral muscles responsible for spinal self-support, ultimately leading to an accentuation of vertebral curves (e.g., increased lumbar lordosis). Studies by Dumas et al. [4], Ostgaard et al. [5], and Bullok et al. [6] have shown that at least one out of two pregnant women has lower back pain.

According to Kristiansson et al. [7], the prevalence of lower back pain varies between 49% and 61%. Recent studies on the practice of physical exercise recommend encouraging pregnant women, without contraindication, to practice aerobic exercise and muscle strengthening to maintain good physical condition. Walking evolves throughout pregnancy depending on the evolution of the static and the possible appearance of pain [8].

For better balance, the step is increased to widen the support polygon. The movements become parallel and not alternating, and hip and knee flexion amplitudes are significant [9]. Walking can become uncomfortable due to the micro-mobility of the sacroiliac joints and the pubic symphysis [10].

Standardization of the six-minute walk test (6MWT) is mandatory to ensure its reproducibility and static use. The benefits of walking during pregnancy are strengthening the lower body (thighs, glutes, calves) and greatly activating blood and lymphatic circulation. It also provides cardiovascular work and regular cardio-respiratory. It improves the body's physical condition and increases the resistance of the heartbeat and blood vessels 20 to 30 min of daily walking for the first 8 months is necessary to reinforce the benefits of exercise.

Walking offers numerous health benefits for pregnant women, including better weight management, improved blood circulation, heart rate and breathing regulation, and facilitation of childbirth and postpartum recovery. Lacoura [11] recommends walking or fast walking as a safe exercise for pregnant women that poses no risks for the baby or the mother.

Regarding psychological changes, Dayan [12] showed that the prevalence of anxiety disorders is about 14%, and the gender distribution shows an over-representation of the female population.

Capponi and Horbacz [13] report that antenatal anxiety is the most frequent psychological disorder of the perinatal period, with a frequency of 13 to 15% during pregnancy.

According to Relier [14], anxiety induces a state of alertness translated at the physiological level by a specific maternal hormonal secretion. These hormones will also permeate the fetus, which may cause clinical manifestations such as increased fetal movements or the onset of fetal tachycardia.

For Delassus and Thomas [15], the medical profession must address antenatal anxiety as a morbidity factor.

Disorders of self-esteem are a risk factor for the development of psychological disorders. Low self-esteem can lead to discomfort and difficulties in relationships with others. Individuals with low self-esteem may never feel good enough, leading to significant suffering. Valors [16] relied on the psychological aspects of pregnancy and childbirth to promote safe childbirth and optimize the duration of dilation and reduce pain intensity.

Physical activity allows pregnant women to maintain their autonomy and psychological well-being by safeguarding their image and self-esteem [17]. Also, mood disorders that can accompany pregnancy (anxiety, depression, stress, anxiety, low self-esteem) are alleviated by the practice of regular and appropriate physical activity, especially during the third trimester.

Here we test whether prenatal gymnastics and psychological support can help reduce pain, maintain walking, reduce anxiety, and improve self-esteem among pregnant women at the Center Hospitalier du Mont Amba in Kinshasa.

Materials and methods

This quasi-experimental study aimed to demonstrate the benefits of a prenatal gymnastics and psychological support program for pregnant women over 8 months from September 2020 to April 2021. The study was conducted at the Mont-Amba Hospital Center in Kinshasa, Democratic Republic of Congo.

Sample

The sample consisted of 38 pregnant women recruited from prenatal consultations at the Mont-Amba Hospital Center in Kinshasa. The study measured parameters such as anxiety, pain, maximal oxygen consumption, and self-esteem before and after the program.

Scales and measures

Visual analog scale (VAS)

Pain intensity was measured using a self-assessment visual analog scale (VAS) [18]. This scale is in the form of a 10 cm plastic ruler graduated in millimeters. During the pain assessment, the examiner presents a slider to the pregnant woman, which is moved along a straight line. One end of the line corresponds to the absence of pain, while the other represents the maximum imaginable pain. The pregnant woman then positions a cursor along the line, where the intensity of her pain can be read in millimeters. The slider's face features millimeter graduations visible only to the examiner.

Hospital Anxiety and Depression scale (HAD scale)

The Hospital Anxiety and Depression Scale (HAD) questionnaire, a standardized and reliable instrument used to screen for anxiety and depressive disorders, assessed anxiety levels among pregnant women [20]. The questionnaire was administered at the beginning and end of the program, and the scores were categorized as follows: a score of ≤7 indicated an absence of symptoms, a score of 8 to 10 indicated doubtful symptomatology, and a score of ≥11 indicated definite symptomatology.

Rosenberg Self-Esteem Scale

The Rosenberg self-esteem questionnaire was used to assess pregnant women's esteem levels [22]. Scores below 25 indicate very low self-esteem, while scores between 25 and 31 indicate low self-esteem. Scores between 32 and 34 indicate average self-esteem, while scores between 35 and 39 indicate high self-esteem. Scores above 39 indicate very high self-esteem.

Maximum oxygen consumption

Maximum oxygen consumption was measured using the six-minute walk test. Distance traveled was converted into maximum oxygen consumption (VO2max) by the following Enright and Sherill formula [19]:

VO2max = [(distance + (30 × time)/5 × time (in min)], and the average speed was obtained by the ratio of distance traveled (meters) to time taken to cover the distance (seconds).

Average speed = $\frac{\Delta \ell}{\Delta t}$ (m/s)

Support Protocol

Prenatal gymnastics

Aerobic exercise intensity was determined by maternal heart rate (HR) (220age) × 60% for each workout. The program contained: stretching exercises for the muscles of the lower limbs and back (8 min), retroversion of the pelvis and dissociation of the pelvic girdle (5 min), muscle strengthening exercises (abdominal and pectoral (5 min) and back (5 min), and breathing exercises (6 min) (normal breathing, deep inspiration and slow expiration to store enough oxygen for the future mother and child). The sessions ended with relaxation exercises.

Psychological support

This support consisted of cognitive-behavioral therapy and/or interpersonal therapy

Ethical consideration

Written informed consent was obtained from the pregnant women. The study protocol was submitted and approved by the Ethics Committee of the School of Public Health of the Faculty of Medicine of the University of Kinshasa under number ESP/CE/254/2019.

Statistical analysis

Our data was entered into a spreadsheet (Microsoft Excel 2013). The data was then exported into SPSS version 21.0 for Windows software. The comparison of the quantitative parameters was made using the student's t-test. For the qualitative parameters, we used the Chi-square test. *P*-values <0.05 were considered statistically significant.

Results

At the beginning of the program, moderate pain was most prevalent in the lumbar and dorsal spine, affecting 14 and 7 pregnant women, respectively (Table 1). However, by the end of the program, the frequency of mild pain had returned in 3 cases of pregnant women. Overall, a significant reduction in pain across all areas was observed at the end of the program.

Table 1: Distribution of pregnant women according to pain zones

	Before			After		
Area of pain	**n=38 no pain**	**pain**	**%**	**n=38 no pain**	**pain**	**%**
Dorsal spine	28	10	26.3	37	1	2.6
Lumbar spine	25	13	34.2	35	3	7.9
Bowl	31	7	18.4	37	1	2.6
Symphysis	30	8	21.1	37	1	2.6

Table 2 demonstrates that walking ability was the most negatively affected aspect of daily life by pain, affecting 18 out of 38 (47.4%) pregnant women at the start of the program. However, by the end of the program, all pain-associated traits that impacted daily life, including general activity, mood, usual work ability, relationships with others, sleep, and enjoyment of life, had disappeared in all pregnant women.

Table 2: Distribution of the negative consequences of pain on the daily life of pregnant women

Components of daily life affected by		**Before**			**After**			
	Yes	**%**	**No**	**%**	**Yes**	**%**	**No**	**%**
General activity	10	26.3	13	56.5	-	-	-	-
Mood	11	28.9	12	52.2	-	-	-	-
Ability to walk	18	47.4	5	21.7	-	-	-	-
Usual work	10	26.3	13	56.5	-	-	-	-
Relationship with others	2	5.3	21	91.3	1	2.6	22	95.7
Sleep	7	18.4	16	69.6	-	-	-	-
Taste of life	2	5.3	21	91.3	-	-	-	-

Table 3 shows that pregnant women significantly reduced their pain and speed, but their VO2max and distance traveled increased after the intervention program.

Table 3: Comparison of average pain values, distance traveled, oxygen consumption, and speed of pregnant women before and after the intervention.

	Before	**After**	***P*-value**
Parameters	**Mean(SD)**	**Mean(SD)**	
VAS	6(0.42)	1.16(0.38)	0.001
Mesured distance (m)	377.45(34.9)	393(36)	0.001
VO_2 max (ml/kg/m^2)	15.1(1.1)	18.5(1.2)	0.001
Average speed (m/sec)	2.2(0.2)	1.9(0.2)	0.001

VAS: Visual analog scale

We detected a significant difference between the parameters of self-esteem and anxiety after the intervention program (Table 4).

Table 4: Evolution of pregnant women's self-esteem and anxiety scores throughout the program.

	Before	**After**	
Parameters	**n(%)**	**n(%)**	***P*-value**
Rosen Berg			
Low	21 (55.3)	0(0%)	0.001
Medium	17 (44.7)	5(13.2)	0.001
Strong	0(0%)	33(86.8)	0.001
HAD			
Uncertain anxiety	12 (31.6)	37(97.4)	0.001
Questionable anxiety	19 (50)	1(2.6)	0.001
Certain anxiety	7 (18.4)	0(0%)	0.001

HAD: Hospital Anxiety and Depression scale

Discussion

This study aimed to demonstrate that a prenatal gymnastics program and psychological support can reduce pain, maintain walking ability, reduce anxiety, and improve self-esteem among pregnant women at the Center Hospitalier du Mont Amba in Kinshasa.

At the beginning of the program, our study recorded back pain intensities of 26.3% in the dorsal column, 34.2% in the lumbar spine, 18.4% in the pelvis, and 21% in the pubic symphysis. However, after following the prenatal physical and psychological preparation program, pregnant women experienced a significant reduction in pain across all areas, with a 97.47% reduction in the dorsal column, 94.7% reduction in the lumbar spine, 97.4% reduction in the pelvis, and 97.4% reduction in the pubic symphysis.

Furthermore, the prenatal gymnastics program and psychological support improved walking ability from 47.4% at the beginning of the program to a complete improvement by the end. The study also found that the program improved general activity, mood, habitual work, sleep, taste for life, and

relationships with others almost entirely. According to Lawani et al., back pain occurs in approximately 56% of pregnant women, with 18% of cases in the groin [20].

The literature indicates that physical activity during pregnancy can reduce the intensity and number of localized pain areas, sometimes resulting in almost complete pain relief. These findings are consistent with several studies demonstrating the positive effects of physical activity for pain relief during pregnancy [21,22].

These results demonstrate the effectiveness of the muscle-building program, which is consistent with other studies by Garshasbi et al. and Morkved et al. [23,24]. These studies also used the same types of exercises proposed in our study, but our program demonstrated significant benefits beyond those of previous studies.

Additionally, the observed decrease in pain among pregnant women after the intervention program aligns with the findings of Uthman et al. [25], who reported in a recent meta-analysis that physical activity positively affects pain.

Cardiorespiratory endurance is a physical quality that enables individuals to perform daily tasks and can be improved through regular physical activity. Our study also measured this parameter and found significant improvements in distance traveled, maximum oxygen consumption, and walking speed.

Moreover, our study found that the prenatal gymnastics program and psychological support at the Center Hospitalier du Mont Amba in Kinshasa resulted in significant improvements in self-esteem, with 86.8% of pregnant women reporting a ‘strong’ score and a substantial reduction in anxiety, with 97.4% of pregnant women showing improvement.

Previous studies have also shown that pregnant women, particularly primiparous women, benefit from education and support that boosts their confidence as women and future mothers, empowering them to manage their lives and overcome social, economic, and professional obstacles [26]. Education should be provided to improve self-esteem and reduce anxiety in pregnant women.

Limitations

The study's reduced sample size of 38 pregnant women who completed the prenatal gymnastics and psychological support program was influenced by the number of new cases of pregnant women received at the PNC of the Center Hospitalier de Mont Amba in Kinshasa.

Conclusion

The prenatal gymnastics program, when combined with psychological support, effectively minimized pregnancy-related risks, including pain, anxiety, self-esteem, and walking difficulties. Therefore, the program's ongoing implementation in the care of pregnant women is encouraged.

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