Sport Sciences and Health Research

University of Tehran
Faculty of
Physical Education and Sport Science

A comparison of the level of stress, anxiety, and depression in professional and novice pregnant female athletes

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Article Info

Original Article

Article history:
Received: 13 April 2023
Revised: 02 July 2023
Accepted: 18 October 2023
Published online: 01 January 2024

Keywords:
female,
pregnancy,
professional athletes,
volleyball players.

Abstract

Background: Pregnancy can be a special but potentially stressful time for women. The routine life of female athletes who become pregnant may be challenged, and professional athletes may be more likely to experience psychological disorders during this time.

Aim: The objective of this study was to compare the stress, anxiety, and depression levels in professional and novice pregnant athletes.

Materials and Methods: 106 female volleyball players (42 professional and 64 novices) were selected as the research sample, based on their competitive levels and study participation criteria. Data were collected using a personal information form and the DASS-21 questionnaire developed by Lovibond 1995.

Results: The results of the MANOVA test showed that pregnant professional athletes had significantly higher levels of stress and depression compared to pregnant novice athletes ($P \leq 0.05$). Although professional athletes had higher levels of anxiety than novice female athletes, there was no statistically significant difference between the two groups on this scale ($P \leq 0.05$).

Conclusion: It seems that female athletes at high competitive levels experience increased psychological challenges because of the added responsibilities of motherhood, in addition to their sports commitments. It is recommended to prioritize physical and psychological interventions and strategies to enhance the mental well-being of these individuals.

Cite this article: Mokaberian M, Namdar Tajari S. "A comparison of the level of stress, anxiety, and depression in professional and novice pregnant female athletes". *Sport Sciences and Health Research*. 2024, 16(1): 95-104. doi: https://doi.org/10.22059/sshr.2024.373581.1128.

EISSN: 2717-2422 | Web site: https://sshr.ut.ac.ir/ | Email: sshr@ut.ac.ir
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1. Introduction

Pregnancy is considered a unique period in women's lives, accompanied by multiple hormonal, physiological, and biomechanical changes such as increased blood volume and heart rate, weight gain, and shifting of the center of gravity. For women experiencing a healthy pregnancy, the American College recommends engaging in regular moderate-intensity physical activity for at least 20 to 30 min per day on most or all days of the week during pregnancy and the postpartum period [1]. The 2008 physical activity guidelines for American women recommend 150 to 300 min of moderate-intensity aerobic activity per week during pregnancy and postpartum [2]. However, most of these recommendations are unsuitable for elite athletes, and the current guidelines consider moderate intensity for pregnant women's physical activity and do not consider the high levels of pre-pregnancy exercises that an elite athlete would like to maintain during pregnancy [3]. Female athletes often feel compelled to decide between being a mother and pursuing professional sports as an elite athlete [4].

Studies have shown that participating in high-intensity sports may result in hypertrophy of the pelvic floor muscles (PFM), which can obstruct the fetal path during childbirth and consequently prolong the second stage of labor. It seems that PFM is associated with unfavorable outcomes in childbirth, such as severe perineal tears (grade 3-4) and lack of labor progress, leading to a higher rate of emergency cesarean sections [5, 6]. However, the opinions of a group of experts in the International Olympic Committee have revealed a significant lack of specific evidence for elite pregnant athletes and the impact of intense exercise during pregnancy on childbirth and the infant [3].

Studies have been conducted to examine the status of pregnant female athletes at high competitive levels, mainly focusing on physiological factors and evaluating indicators such as birth weight of infants [7, 8, 9] and preterm birth [10, 11].

In another study that compared the experiences of elite athletes with non-elite athletes (130 elite athletes and 118 non-elite athletes), it was found that participation in competitive sports at an elite level had no significant impact on undesirable childbirth outcomes, including duration of labor, need for cesarean section during childbirth, and severe perineal tears [12].

Furthermore, some research findings indicate that there is no association between being engaged in competitive sports and the rate of cesarean section in pregnant women [10, 11, 12]. However, by examining the previous research, it becomes apparent that very few studies have evaluated the psychological characteristics of pregnant women, especially those involved in sports at high competitive levels. This is significant because elite and semi-elite athletes are exposed to a wide range of psychosocial stressors during their professional careers and often experience compromised mental health and various psychological disorders during this period [13].

High prevalence of psychological disorders has been reported among Australian elite athletes, particularly in depression (27%), eating disorders (23%), and anxiety (17%) [14].

A study on the prevalence of mental health issues among elite athletes in the United Kingdom demonstrated that approximately 48% of individuals had symptoms of anxiety/ depression, while nearly 27% exhibited symptoms of distress,

and it was found that female athletes had lower levels of mental well-being compared to male athletes [15].

A cross-sectional study on adult athletes in the national team showed that female athletes reported higher rates of mental health disorders and lower rates of psychological well-being [16]. Additionally, studies have shown that female athletes are twice as likely as male athletes to experience symptoms of depression and have higher levels of anxiety and eating disorders, with the prevalence ranging from 6% to 45% in women [17].

Pregnancy for women is a special period in their life cycle. Mood disorders such as depression and anxiety are common during pregnancy. Perceived stress refers to a level at which an individual perceives their life events as unpredictable, uncontrollable, and stressful [18]. Anxiety is a facet of stress that occurs in response to internal and external stimuli and is a negative emotional state accompanied by distress, worry, and physiological arousal or stimulation [19]. Stress is emotional strain and pressure, a type of psychological pain. It can improve athletic performance, motivation, and reaction to the environment, but excessive stress can lead to mental and physical health issues, such as depression. Depression is a mental state featuring low mood and aversion to activity, affecting thoughts, behavior, feelings, and well-being. Depressed individuals often experience loss of motivation and interest in pleasurable activities [20]. Furthermore, in depression (sadness), an individual experiences sadness, sorrow, and dissatisfaction, and they cannot feel happiness and pleasure that may be experienced by anyone in any level or situation. Specific symptoms of depression include dissatisfaction, lack of energy and interest, low self-confidence, and feelings of sadness and sorrow [21].

In studies conducted, preterm labor, infant-related problems during birth, lower birth weight, and long-term health consequences for children have been associated with maternal mental disorders. Anxiety, stress, and depression in pregnant mothers may have long-term consequences for infant cognitive development and an increased likelihood of behavioral problems. Anxiety and reported depression in mothers are associated with behavioral problems in young children, emphasizing the importance of addressing maternal mental health during pregnancy [22].

In general, knowledge about female athletes at high skill levels and their psychological characteristics during pregnancy is very limited. Considering the above information and the importance of addressing the psychological issues of pregnant female athletes, and the lack of a study comparing stress, anxiety, and depression in pregnant women at different competitive levels, this study aimed to compare stress, anxiety, and depression in professional and novice volleyball players during pregnancy.

2. Materials and Methods

The present study is considered as an applied research.

2.1. Participation

The study population consisted of female volleyball players at different competitive levels who had experienced their first motherhood. To obtain information related to professional and novice female athletes, contacts were made with provincial volleyball associations and athletes were assessed at different skill levels based on the study inclusion criteria. Ultimately, 106

female athletes (42 professional, 64 novice) were selected as the sample.

The inclusion criteria were: pregnancy age between 18 to 35 years, planned pregnancy, professional female athletes participating in the highest competitive level within three years before their first pregnancy, no history of miscarriage, no use of psychotropic drugs, at least secondary education, and singleton pregnancy. The exclusion criteria included high-risk pregnancy, previous planned cesarean section, and having a pre-pregnancy body mass index (BMI) higher than 30 [12, 23]. Players who had participated in the national first and second-division leagues but did not have a history of national team participation were considered professional athletes. Novice athletes are referred to those with at least three months and at most one year of experience in a specific sports discipline [24, 25].

2.2. Instrument

Personal Information Form. It includes items such as sports activity history and level, mother's and father's age, pregnancy age, monthly income, mother's and father's education, father's, and mother's occupation.

DASS-21 Questionnaire. The Stress-Anxiety-Depression Questionnaire was developed by Lovibond in 1995 to measure stress, anxiety, and depression. It consists of 21 questions, with each 7 questions related to a specific domain. It is designed as a Likert scale with options of "not at all", "a little", "moderate", and "a lot". The depression scale measures dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest/ involvement, anhedonia, and inertia. The anxiety scale evaluates autonomic arousal, skeletal muscle effects, situational anxiety, and the subjective experience of anxious affect. Depression, anxiety, and stress scores are obtained by adding up the scores for the relevant items. The recommended cut-off scores for severe categories are Depression 21+, Anxiety 15+, Stress 26+ [26].

This questionnaire is a standardized tool that has been used in most domestic and foreign studies. The validity of this tool has been confirmed by Aghebati and Mohammadi (2010) [27], Moradipanah and Eesa (2009) [28], the Cronbach's alpha coefficient was reported as 0.94 for depression, 0.92 for anxiety, and 0.82 for stress. In the present study, the Cronbach's alpha coefficients for the subscales of stress, anxiety, and depression were obtained as 0.84, 0.86, and 0.88, respectively, indicating acceptable reliability of the research tool.

2.3. Procedure

Upon the completion of the volleyball player selection process, comprehensive instructions were provided to ensure a thorough understanding of the questionnaire completion process. Subsequently, all selected volleyball players actively took part in the administration of both the DASS-21 Questionnaire and the Personal Information Form.

2.4. Statistic

To analyze the raw data, descriptive statistics (for calculating central tendencies and dispersions) and inferential statistics were used. Kolmogorov-Smirnov test was used to examine the normality of data distribution, and Levene's test was used to ensure the homogeneity of variances. In addition, multivariate analysis of variance (MANOVA) was used with its assumptions checked, and the significance level was set at 0.05 divided by the number of dependent

variables [3] which is commonly known as Bonferroni adjustment, to reduce Type I error. All statistical analyses were performed using the statistical software IBM SPSS Statistics for Windows, version 26 (IBM Corp., Armonk, N.Y., USA). Statistical significance was set at $P<0.05$.

3. Results

Initially, the sociodemographic characteristics of both professional and novice female athletes were examined. As seen in Table 1, the comparison of sociodemographic characteristics of the two groups showed no significant differences in terms of mother's and father's age ($P<0.05$). For the variables of mother's and father's age, and gestational age, an independent t-test was conducted. mother's and father's education, and monthly income status were analyzed using the chi-square test. Fisher's exact test was used to analyze the mother's and father's education (Table 1).

Table 1. Comparison of sociodemographic characteristics of participants in two groups of professional and novice pregnant female athletes

Variables	Professional athletes	Novice athletes	df	P value
Mother's age	26.45±1.56	26.87±1.39	104	0.139
Father's age	30.67±2.49	31.50±2.95	104	0.134
Gestational age	31.02±3.67	30.56±4.29	104	0.555
Monthly income				
5-10 million Tomans	6	3	3	0.94
11-16 million Tomans	28	17		
17-22 million Tomans	25	18		
Over 23 million Tomans	5	4		
Mother's education				
Third middle school to diploma	5	5	3	0.86
Master's and bachelor's degree	36	21		
Master's degree	21	15		
PhD and above	2	1		
Father's education				
Third middle school to diploma	2	5	3	0.12
Master's and bachelor's degree	47	25		
Master's degree	13	12		
PhD and above	2	0		
Mother's occupation				
Employed	31	19	1	0.84
Housewife	33	23		
Father's occupation				
Freelance job	37	23	1	0.84
Employee	27	19		

To compare the psychological characteristics of professional and novice female athletes, a multivariate analysis of variance (MANOVA) test was used. The results of the Wilks' lambda test indicated a significant difference in the psychological characteristics between the two groups:

$F(3, 102)= 81.14$, $P= 0.001$; Wilk's $\Lambda= 0.704$, partial $\eta 2 = 0.30$.

To investigate which subscales of the dependent variables showed significant differences between the two groups of pregnant female athletes (professional and novice), a simple analysis of variance was

conducted as a follow-up test to the MANOVA (Table 2). When looking at the average and standard deviation of the psychological characteristics in professional and novice pregnant female athletes, and considering the means and significance level in Table 2, it's evident that there is a significant difference in the stress and depression subscales between the pregnant females in the two groups. Professional pregnant athletes significantly exhibit higher levels of stress and depression compared to novice pregnant athletes ($P \leq 0.016$).

Table 2. Comparison of stress, anxiety, and depression scores of participants in two groups of professional and novice pregnant female athletes

Variables	Professional athletes, n=42 (X±sd)	Novice athletes, n=64 (X±sd)	F	*P*	η2
Stress	7.19 ± 0.59	6.92 ± 0.63	8.756	0.004	0.078
Anxiety	6.92 ± 0.63	6.60 ± 0.83	4.447	0.037	0.041
Depression	7.33 ± 0.65	6.46 ± 0.68	4.704	0.001	0.286

4. Discussion

This study aimed to compare the psychological characteristics of professional and novice pregnant female athletes. The results of the study showed that professional pregnant athletes had higher average scores than novices in all three subscales of stress, anxiety, and depression, with the difference being statistically significant in stress and depression. Due to limited studies conducted in this field, comparing the present study's results with those of other studies is challenging. Still, it can be said to be consistent with some previous research [13, 29]. Pascoe and colleagues (2022), in their investigation of psychological stressors in elite female athletes, stated that athletes at higher competitive levels usually experience concerns and mental health disturbances. In their review article, they focused on investigating the socio-psychological stress factors contributing to mental health outcomes in female athletes and identified one of the socio-psychological stressors as the consequences related to family care and motherhood [29]. In line with this, by employing Bronfenbrenner's ecological systems theory [30] and the modifications by Sallis (2008) [31], it has been revealed that human experiences are influenced by various individual, interpersonal, organizational, and socio-cultural situations, and the psychological stress factors affecting mental health among female athletes are related to individual stressors associated with family care, motherhood, and responsibilities of childcare [29].

Moreover, female athletes are facing psychological stress related to concerns about their team when taking time off for pregnancy, making decisions about the timing of ovulation, dealing with issues related to irregular menstrual cycles, and using fertility drugs. This stress can have an impact on their mental health and fertility [32].

In explaining the research findings, it can be said that stress refers to the degree to which individuals perceive their life events as unpredictable, uncontrollable, and demanding [18]. In other words, stress can be understood as a state or condition in which a person evaluates the environment as surpassing their resources or posing a threat to their health. Since the source of stress is not removable, and individuals are inevitably confronted with it, they seek coping mechanisms [33, 34]. The

evolutionary response of the human organism to stress is the fight, flight, or freeze response, which becomes active in the face of stressful conditions and prepares the individual for coping by creating changes in the body's electro-physiological state [35].

It appears that in the present study, females who are at high competitive levels and are professional athletes perceive pregnancy as an uncontrollable event and a factor that distances them from sports, thereby increasing their stress compared to novice pregnant athletes. Since novice female athletes were engaged in low-level competitive activities, they continued to engage in moderate-level activities during pregnancy, and pregnancy was not a stressor for them. Furthermore, the highest average scores in the responses of professional female athletes were related to the questions "It is difficult for me to relax" and "It is difficult for me to be calm and stay calm". This indicates that pregnancy not only caused professional female athletes to refrain from their sports activities but also made them uncomfortable with being less active during pregnancy. Overall, the concerns of professional female athletes that they may not be able to return to their professional sports level and the reduction in physical activity during pregnancy have contributed to increased stress for them compared to novice female athletes.

Another part of the research results showed that depression in pregnant professional athletes significantly increased compared to novice athletes. Depression refers to a feeling of sadness, lack of pleasure, and despair, and the inability to experience joy and happiness, which can occur in any race, class, or social situation. Specific symptoms of depression include dissatisfaction, loss of energy and interests, low self-confidence, feelings of sadness and guilt, changes in appetite, and sleep patterns, all of which are among the potential factors that can affect a decrease in work performance [21].

In the present study, by examining the responses of individuals, it was found that the highest average scores were related to items such as "I feel depressed and broken-hearted", "I cannot show enthusiasm about many things", and "I feel worthless as a person" in pregnant professional athletes. Sports play a crucial role in the lives of individuals participating at high competitive levels. A reduction or cessation of professional activity among athletes can result in feelings of depression and diminished enthusiasm, akin to the withdrawal symptoms experienced by individuals who discontinue sports involvement. Furthermore, the physical changes experienced by professional athletes, including a decline in mobility, may lead them to perceive themselves as no longer possessing the value they once had in their athletic capacity.

5. Conclusion

Overall, the results of the present study showed that pregnant professional athletes experienced significantly higher levels of stress and anxiety compared to pregnant novice athletes. In general, pregnancy itself is considered a factor in hormonal, physical, and psychological changes in women, and these psychological stressors are doubly intensified for women who are highly engaged in sports and competition. Therefore, it is suggested that coaches and healthcare providers consider strategies and interventions such as relaxation techniques, music therapy, mindfulness, etc., to reduce psychological stress in female athletes at high competitive levels. The limitations of

the present study include a small sample size, cross-sectional design, and investigation of a specific sport. Future research is recommended to address these issues.

Conflict of interest

The authors declared no conflicts of interest.

Authors' contributions

All authors contributed to the original idea, study design. Conceptualization, M.M. methodology, M.M. and S.N.T; formal analysis, M.M. and S.N.T; investigation, M.M.; writing—original draft preparation, M.M.; writing—review and editing, M.M. and S.N.T; funding acquisition, M.M. All authors have read and agreed to the published version of the manuscript.

Ethical considerations

The authors have completely considered ethical issues, including informed consent, plagiarism, data fabrication, misconduct, and/or falsification, double publication and/or redundancy, submission, etc. This research is conducted following all ethical codes. IR.SHAHROODUT.REC.14002.003.

Data availability

The dataset generated and analyzed during the current study is available from the corresponding author on reasonable request.

Funding

This research was funded by Shahrood University of Technology, grant number 42029.

Acknowledgment

The authors express their sincere gratitude to those athletes who helped them in this project.

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