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ORIGINAL

GESTATIONAL DIABETES MELLITUS AMONG WOMEN ATHLETES IN TURKEY: A CASE OF WOMEN SPORTS HEALTH

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ABSTRACT

The term "pregnant athlete" is gaining much attention today due to the persistently increasing number of women athletes who continue participating in the game and other associated training sessions. However, during pregnancy, some women suffer from gestational diabetes mellitus (GDM), which often impacts their overall physical performance and activities. However, sports federations in Turkey have provided no health-related guidelines regarding GMD. Therefore, this study focuses on screening tests for GDM in women athletes in Turkey. This study also determined different challenges and issues faced by women athletes suffering from GDM during their training sessions. For this purpose, an experimental and a qualitative approach were utilized. In the experiment approach, the "oral glucose tolerance test" (OGTT) criteria were used to carry out the screening tests of the target population. 120 participants were included based on the proposed inclusion and exclusion criteria. Most of these women did not have a family history of diabetes. However, in the second stage, semi-structured interviews were conducted with ten randomly selected respondents among these 120 women athletes. After the interviews, transcription was analyzed via NVivo and thematic analysis was conducted. The results showed that the pregnant women athletes did not have proper health-related guidelines and often faced issues in managing their diet and exercise regime. Therefore, this study has also effectively provided important practical and theoretical implications.

KEYWORDS: Gestational Diabetes Mellitus; Women; Athletes; Turkey; Sports; Pregnancy; Health

1. INTRODUCTION

With the progress in the world, the advancements in different sectors are increasing. But with these advancements, concerns about different things are

also increasing. There are countries that are trying to focus on their weak sectors and also adopting such practices and techniques that can enhance their sectors (Bundervoet, Dávalos, & Garcia, 2022). Sports in different countries are progressing with having advancements along with it. There are some certain countries, such as the United States, South Korea, Turkey, Australia, Brazil etc., that have a great sports system (Doherty, Millar, & Misener, 2022). But in the past few years, the concerns are changed from just focusing on the sector to focusing on the athletes. The countries are trying to focus on the health of the athletes and the problems they suffer from. This concern has been increased, especially after the pandemic, that to take care of the athletes is more important (Matolić, Jurakić, Podnar, Radman, & Pedišić, 2023). These concerns are specially related to women athletes. There are different health issues that can occur in women athletes, such as ACL tears, pain syndrome, different bone-related issues etc. (de Borja, Chang, Watkins, & Senter, 2022). One of the major yet common diseases that can occur in women athletes is gestational diabetes mellitus. Gestational Diabetes Mellitus is one of the type of diabetes that is related to glucose intolerance and usually occurs during the women's pregnancy (Yang & Wu, 2022).

According to recent statistics (CDC, 2023), the percentage of women having gestational diabetes mellitus during pregnancy has been increased to 56% in the United States. Turkey is one of the countries where women are suffering from this issue. Even after having the latest technology and advancements, still, the issue is not over. According to an estimate, the percentage of gestational diabetes mellitus in women varies from 2.6 to 27.9% in Turkey after the researches were conducted in some parts of the country (Karaçam & Çelİk, 2021). But there are different researches that discuss about the fact that women athletes are at the less risk of this type of diabetes due to their certain routines of exercise. The reason for this discussion is that the researches proved that physical exercises and activities during pregnancy can save women from many diseases (Sitzberger et al., 2020). Different researchers have conducted studies on diabetes and its different types. Researches have also been conducted on athletes. But there are not many studies that discuss about gestational diabetes mellitus, especially in the case of women athletes. The few studies that have been conducted about gestational diabetes mellitus in the case of women athletes, do not talk specifically in the context of women athletes in pregnancy.

Moreover, the studies that have already been conducted are not concerned much about gestational diabetes mellitus in the case of women athletes in Turkey. This is the reason why the current research study has been conducted to see the gestational diabetes mellitus among women athletes in Turkey. For this purpose, the aim of this research study is to conduct screening tests of women athletes suffering from gestational diabetes mellitus in Turkey. The objectives of the study also include to determine the complications faced by women athletes during pregnancy. This research study contributes to the existing literature as it provides insight into the issue that needed to be discussed a lot but still does not have much research conducted on it. This is the reason it can contribute to expand the literature. It can provide a great help to the researchers that will conduct researches on

this topic in future. It can also be really significant and beneficial for women athletes, especially during pregnancy. This is the reason that this research study has a wide scope for sports and for women athletes.

2. LITERATURE REVIEW

Diabetes (Klein, Gastaldelli, Yki-Järvinen, & Scherer, 2022) is a disease in which the body of the person stops making insulin or even sometimes stops using the insulin properly. This can cause the blood sugar to be high, which can be harmful to the person. Diabetes is considered as one of the chronic diseases. There are three basic types of diabetes that are considered important to be discussed, and many studies have discussed these types (Adam et al., 2023): type 1, type 2 and gestational diabetes mellitus. Type 1 is diabetes that usually occurs due to the fact when the body starts attacking own self, and as a result of this attack, the body stops making insulin. But this type is not very common in the patient with diabetes. Type 2 (Padhi, Nayak, & Behera, 2020) is diabetes that is most common to occur. It is the type in which the body is not able to use insulin, and this causes the blood sugar to be high. The third type is most common n women during pregnancy. It is gestational diabetes mellitus. This can occur even in women who do not have any kind of diabetes before pregnancy. When women during pregnancy are diagnosed with this diabetes, it increases their chances to have type 2 diabetes. It can cause a risk to the baby also (Choudhury & Rajeswari, 2021).

Gestational diabetes mellitus is the type of diabetes that occurs in women during pregnancy, and in some cases, it usually ends after the baby is born. But researches have proved that there are cases in which it is retained by the patient. Gestational diabetes mellitus usually occurs in women during pregnancy because, during that time period, the body of women goes through a lot of changes, especially weight gain. This causes the body to use insulin less effectively and causes the disease (Kondracki, Valente, Ibrahimou, & Bursac, 2022). It can also cause great harm when it is diagnosed in women during pregnancy (Chiefari, Arcidiacono, Foti, & Brunetti, 2017). These complications may include early loss in pregnancy, premature birth, abnormality etc. An early loss in pregnancy (Wang et al., 2022) means when the woman loses their baby even before the 20 weeks of the gestational stage. Gestational diabetes mellitus increases the chances of loss in early pregnancy when it occurs in a woman during pregnancy. Sometimes, the loss may occur even before gestational diabetes mellitus is diagnosed. Premature birth (Punnose et al., 2022) is also one of the biggest risk factors caused by gestational diabetes mellitus. Premature birth means when the baby is born even before the 37 weeks of pregnancy, which can be greatly harmful to child and mother both. By abnormality (Lee et al., 2023), it is meant to be abnormal in different ways, such as the baby might develop a neural disorder, may lack in certain immunity controls etc. the rate of abnormalities in newborns due to gestational diabetes mellitus has always been a point of concern. Screening tests (Tong et al., 2022) are used for the purpose to monitor blood sugar during pregnancy. The screening test mostly takes 2 hours to get completed. There are two type of screening tests that are used: one-step screening and two-step screening. Initially, the one-step screening was used but then two-

step also started to get used due to not having much strong basis for one-step test. The difference between one-step screening and two-step screening is that in one-step 75-g glucose is tested in the fasting state while in two-step 50-g glucose is tested in the non-fasting state (Saccone, Khalifeh, Al-Kouatly, Sendek, & Berghella, 2020). This is still not proved which way of screening gestational diabetes mellitus is correct. The following are the diagnostic criteria for gestational diabetes mellitus given by different institutions.

Table 2.1. Diagnostic Criteria for Gestational Diabetes Mellitus (ÖZDEMİR, 2022)

WHO	IADPSG – GDM diagnostic criteria
Endocrine Society	IADPSG – GDM diagnostic criteria
ADA	Single step screening (75gr OGTT) with IADPSG – GDM diagnostic criteria Two-step approach (CC* or NDDG criteria) with 50 g GCT and 100 g OGTT
NIH	Two-step approach (CC* or NDDG criteria) with 50 g GCT and 100 g OGTT
ACOG	Two-step approach (CC* or NDDG criteria) with 50 g GCT and 100 g OGTT

Different researches have been conducted to see that does gestational diabetes mellitus affect all women during pregnancy equally or not. Initially, the results showed that women with an effective level of glycaemia are at slightly less risk (Affres et al., 2021). But after a few researches, it was identified that gestational diabetes mellitus was less problematic in the case of women athletes but not completely. The reason that gestational diabetes mellitus was not extremely harmful to women athletes was their routine of physical activity (Álvarez Carnero et al., 2023). A recent research study (Mottola, Thornton, & Davenport, 2023) described how players and women athletes are at a lower risk of gestational diabetes mellitus during pregnancy due to exercise and physical activity. But this is true only in the case if the exercises being managed in a proper and prescribed way. The study discussed how only in recent times women are getting able to perform as athletes. It explained that this opportunity brought the chance to identify that women during pregnancy need a healthy physical activity and exercise routine as this was the reason for less risk for the women athletes. Another study (Álvarez Carnero et al., 2023) discussed how by using a healthy routine with exercises, women could have less risk during pregnancy even if caught by gestational diabetes mellitus. But it is necessary to not have extra hectic routines as that can cause harm to the person. The study further stated that not only during pregnancy but even after the pregnancy, the women should continue the routine of exercises for some time. It also described that this s the reason why women athletes are at less risk than others.

3. METHOD

This study mainly focuses on gestational diabetes mellitus (GDM) among women athletes in Turkey to determine the different complications they face during this condition. This section mainly focuses on the current study's research methodology to fulfil the study's aim.

3.1 Participants

For this study, athletic pregnant women were taken into account from public hospitals in Turkey. Effective inclusion and exclusion criteria were developed for this study. Therefore, only voluntary participants were taken into account for this study. In order to be eligible for this study, the women athletes must be screened for GDM between "24 and 28 weeks of gestation" within the context of the index pregnancy. For this purpose, different professional medical record abstractors randomly reviewed the selected women's charts to ensure the inclusion criteria. About 350 charts were reviewed, and 180 women athletes were found to be eligible for the inclusion criteria.

However, the collected data was later narrowed down based on the past medical record of the selected women. Therefore, no women athletes with mental health, kidney, liver, and heart-related issues were included in this study. Thus, the final sample of the selected women athletes with GDM for this study was 120.

3.2 Research Approach

For this study, both experimental and qualitative approaches have been considered. This study is conducted in two steps. In the first step, screening tests of the selected target population of women athletes were conducted to determine the total number of women athletes suffering from GDM. Different diagnostic criteria have been proposed in past studies for GDM, which include the "American Society of Obstetrics and Gynecology" (ACOG), "oral glucose tolerance test" (OGTT) and others.

- **Screening Tests**

For this study, the OGTT criteria have been used for carrying out the screening tests of the selected target population. The criteria based on a 3-hour 100g OGTT are presented in Table 3.1 (Association, 2017). The ACOG approves the diagnostic criteria. "Diabetes Data Group" (NDDG) criteria are a conversion of O'Sullivan's blood thresholds. Carpenter and Coustan prefer another modification of these data.

Table 3.1. 100 gr OGTT – GDM Diagnostic Criteria

Screening test (50 gr 1st hour)		**Plasma glucose 130 – 140 mg/dl**
100 g OGTT (mg/dl)*	NDDG	Carpenter and Coustan
Fasting glucose	105	95
1-hour glucose	190	180
2-hour glucose	165	155
3-hour glucose	145	140

After carrying out the screening test, the exclusion and inclusion criteria were considered for the selection of the final sample.

- **Semi-Structured Interviews**

In the second step of this research, semi-structured interviews were conducted with the women athletes suffering from GDM to determine the different complications that they face during this condition. Therefore, 120

women athletes with GDM were selected after the screening test based on the inclusion and exclusion criteria. Due to time constraints, this sample size was inconvenient for the researcher to conduct semi-structured interviews, so random sampling was used, and a sample of 10 respondents was selected to carry out interviews. Face-to-face interviews were conducted with the participants. Each interview was completed in 30-40 minutes, and the consent of the participants was taken for recording the interviews. For this purpose, the following interview questions were developed based on the past literature:

1. Have you faced any challenges in your training routine due to GDM?
2. What changes have you made in your diet and exercise routine to manage GDM so it does not influence your athletic performance?
3. Have you faced any side effects of the medical treatment you are provided with GDM? If yes, do they influence your performance as a woman athlete?
4. In your opinion, does the sports organization in Turkey highlight such issues, focusing on the health of women athletes? What is your take on it?
5. Were you provided with the required guidelines regarding GDM throughout your athletic career?
6. Do you still feel fit to carry out your duties as an athlete during this condition? What advice would you give to the other women athletes going through the same stage?

3.3 Data Analysis

After conducting the interviews, the edited version of their transcription was obtained and analyzed effectively. For this purpose, NVivo software was used, and codification was done, leading to the development of important themes for thematic analysis.

4. RESULTS

4.1 Screening Tests Results

For the participants' screening test, the participants' fasting glucose was measured. Later, each participant was given 8 ounces of a glucose solution to drink, which included 100g of sugar, and the sugar test was conducted after 2 and 3 hours, respectively. The OGTT criteria were used for this purpose.

Table 4.1. Results of screening tests

Screening test 100 g OGTT (mg/dl)	Controlled Plasma glucose mg/dl	No. of participants	Detected plasma glucose (mg/dl) (first week)	Detected plasma glucose (mg/dl) (fourth week)
Fasting glucose	95	50	100	110
1-hour glucose	180	170	175	160
2-hour glucose	155	65	160	161
3-hour glucose	140	65	145	147

Table 4.1 shows the results of the conducted screening test. The results

obtained from this study showed that among 350 participants, the glucose level of 180 women athletes was greater than the controlled values in the first and fourth weeks. Therefore, the recorded number of women athletes suffering from GDM was 180. The past medical history and other records of these women were also evaluated, and 30 women athletes were excluded as they were from liver and kidney issues. In comparison, 15 women athletes were removed due to mental health issues, and 15 left this study willingly. Thus, the total number of women athletes suffering from GDM was 120.

4.2 Demographics of Participants

The total number of participants selected based on the inclusion and exclusion criteria was 120 women athletes with GDM were selected. Table 4.2 shows the demographics of selected participants. This table shows that most of the women athletes (50%) with GDM were 20 to 25 years old. It has also been observed that the body mass index (BMI) of 41.6% of women athletes was recorded to be 24.9 to 30 kg/$m^{2,}$ and another 41.6% of participants' BMI was recorded to be 41.6%. About 50% of the participants have no family history of diabetes, while 33.33% have a family history of diabetes. Additionally, 16.6% of the participants experienced weight gain in the first trimester, and 12.5% of participants gained weight in 2nd trimester.

Table 4.2. Demographics of participants

Characteristics	No. of participants (n)	%
Delivery age (years)		
20 to 25	60	50
26 to 30	30	25
More than 30	30	25
BMI (kg/m^2)		
18.6 to 24.8	20	16.6
24.9 to 30	50	41.6
More than 30	50	41.6
Family history of "diabetes."		
1st relative	40	33.3
2nd relative	20	16.6
None	60	50
Weight gain rate (kg/m^2)		
1st trimester	20	16.6
2nd trimester	15	12.5

4.3 Semi-structured Interviews Results

Due to time constraints and limited resources, a sample of ten respondents was randomly selected from 120 participants for conducting semi-structured interviews; after the collection of required data, thematic analysis was done, and the following themes were formulated:

- Theme I: Training
  - *Theme Ia: Diet and Exercise*
- Theme II: Medical Treatment
- Theme III: Sports Organization
  - *Theme IIIa: Athletic Career*
  - *Theme IIIb: Advice for Women Athletes*

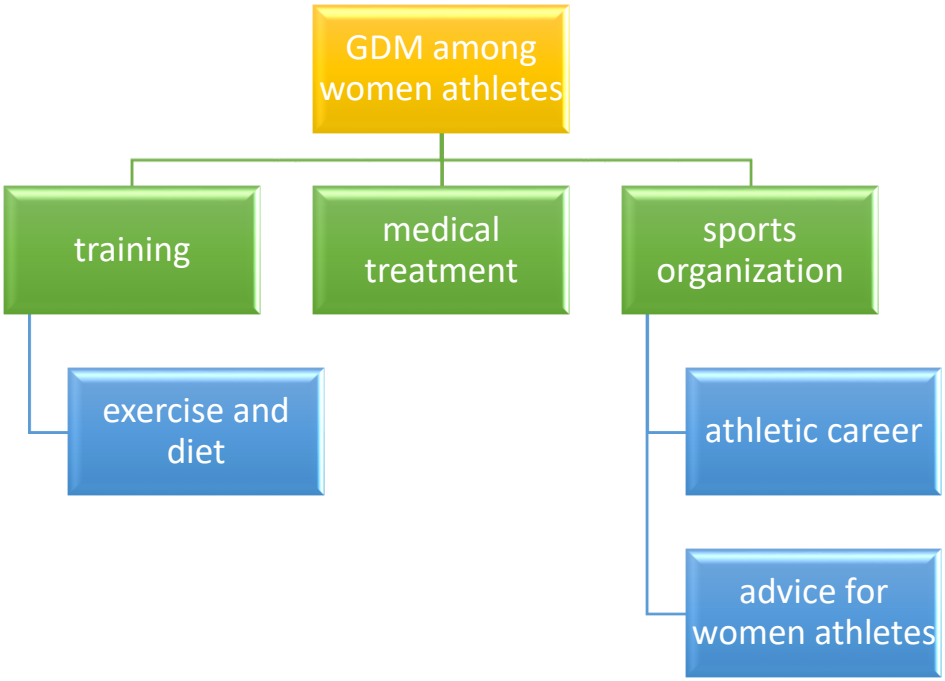

Figure 4.1. Mind map of thematic analysis

- **Theme I: Training**

Eight respondents faced various issues during their training sessions due to GDM. They stated that they could not measure their glucose level before, during and after the training sessions due to hectic routines and physical activity. These respondents also reduced the intensity of their workouts. In support of this argument, one of the respondents stated:

"I suffered from hypoglycemia due to intensive workouts and training sessions, so I made certain changes in my training routine."

Five respondents focused on self-care during such conditions, which helped them manage their training regime accordingly to keep their glucose levels in control. The sports dieticians and health providers of these respondents also provided important guidelines to manage their glucose levels and health to overcome the issues associated with GDM.

- **Theme Ia: Diet and Exercise**

Six respondents became very cautious regarding their diet and exercise due to GDM. They took extra care to manage their carbohydrate intake. Most of these women athletes carried out heavy physical activities requiring a larger carbohydrate intake, so they reduced the intensity of their exercise and focused on incorporating proteins into their diet. In this regard, one of the participants said:

"I reduced the portion of my meals to keep myself full to ensure active performance."

Another respondent stated:

"It is a misconception that you cannot exercise during pregnancy… well, as far as my knowledge goes, about 18 pregnant women participated in the Olympics."

Diet and exercise are considered the main focus of concerns for women athletes as they have to maintain themselves physically to carry out different important and tough physical activities. Therefore, it is often difficult for women athletes suffering from GMD to manage their diet and exercise accordingly.

- **Theme II: Medical Treatment**

Most women athletes who participated in this study have not prescribed any medication for their GDM and were advised to manage their diet and routine to manage their GDM; however, four respondents were provided required medical treatments. In this regard, one of the respondents said:

"I was prescribed metformin for my GDM... It helped me manage my glucose level and weight, and I performed well during my training session."

Two of the participants were prescribed insulin due to their GDM. One of them had a fear of needles, so she was not able to perform her best during the training.

- **Theme III: Sports Organization**

In sports, managing athletes' health has become a major concern for many sports organizations. However, the respondents believed that the Sports Federation in Turkey had taken important measures to highlight different gender-based health-related issues such as menstruation and others; however, not much focus has been given to the health of pregnant women athletes. In support of this argument, one of the respondents stated:

"When I found out that I was pregnant, I was advised to quit the sports world.. moreover, when I discussed with my sports dietician that I was suffering from GDM, he advised me to take a break until my delivery."

The respondents believed that their GDM became a hurdle for them in achieving their targets and they were not treated equally as their fellow women athletes who were not pregnant and did not have GDM.

- **Theme IIIa: Athletic Career**

Seven respondents stated that they were never guided regarding the complications during pregnancy. Even though the sports federation was responsible for ensuring the athletes' health and safety, they did not focus on important health-related issues. In this regard, one of the respondents stated:

"Sports federation in Turkey held different seminars such as "Sport for All", "Lifelong Sport", "Sport for Quality of Life and Health", "Healthy Diet" and "Wellness," but no focus has been given on GDM or pregnancy complications for pregnant women athletes."

○ Theme IIIb: Advice for Women Athletes

Six respondents stated that with the help of their gynaecologist and sports dietician, they could maintain their diet and exercise, which helped them carry out their training sessions and other physical activities effectively. These respondents suggested that sports organizations should also focus on the health of women athletes going through pregnancy instead of demotivating them. In this regard, one of the respondents stated:

"The sports federations should highlight gender-based health-related issues to improve the knowledge of the people suffering from such conditions."

5. DISCUSSION

The current research study conducted screening tests of women athletes suffering from gestational diabetes mellitus in Turkey. This research study is also conducted to determine the complications faced by women athletes during pregnancy. This research study used the experimental approach and qualitative approach, both. For the purpose of data collection, the athletic pregnant women from public hospitals in Turkey were taken into account. These women were screened for gestational diabetes mellitus between 24 and 28 weeks of gestation. At the first step, the screening test is done for all the women. After this, the researcher conducted semi-structured interviews and asked different related questions to the women. For the purpose of a qualitative approach, thematic analysis was used. Thematic analysis (Braun & Clarke, 2023) is the type of qualitative approach analysis that identify the themes in between the data recorded from the participants. The first theme focused on the training of the women athletes to see whether the women athletes face any kind of problem during the pregnancy period in their training due to the gestational diabetes mellitus. Some participants had complained of hypoglycemia due to the hectic routine of workout and training, while the other participants, who managed the training routines well and according to their health, were able to manage the training as well as their glucose level. Al Nadhiri, Al Hashmi, Alaloul, and Al Omari (2023) discussed the same problem in the research study.

This research study stated that it is important to identify how much exercise is good for the health of women during pregnancy. Because hectic exercises can harm glucose and insulin levels, but if the exercises are managed as consulted by the doctor, it can help a lot during pregnancy, even if the women have gestational diabetes mellitus. This theme also focused on the diet and exercise of the women athlete. Most of the respondents about exercise were sure that the exercises with proper consultation do not harm the women or the baby. Some respondents reported that they have to take extra care of their diet due to heavy exercises and also have to reduce the intensity of the exercises. Su, Chang, and Sun (2023) discussed in a recent study that it is very important for women to understand and consult the doctor for their exercise and diet. Especially for the first pregnancy and first gestational diabetes mellitus. The second theme focused on the medical treatment of women athletes during gestational diabetes mellitus. Some

participants mentioned that they were not prescribed any special medicine or treatment for gestational diabetes mellitus by their doctors. Few of the respondents described that they were given some prescriptions from their doctors for the treatment of gestational diabetes mellitus. A research study suggested that most of the time, women are not able to take medical help in case of gestational diabetes mellitus as doctors do not pay attention towards this issue that seriously. But, from the past few years, the doctors at some hospitals have been trying to manage this issue well (Sheng et al., 2023).

The results of the current research study show that women athletes need to take care of their diet and exercise even if they are continuing their training. They need to take proper consultation for the training and diet. The third theme focused on the sports organization of Turkey. It also focused on the athletic career and advice for women athletes. Most of the participants faced this issue during pregnancy, and they were asked to quit the game as it might cause problems for them. But the participants also mentioned how recently the sports organization of Turkey has started taking care of this issue. A study (Darroch, Smith, Sheppard-Perkins, Giles, & Wykes, 2023) discussed how women athletes suffer and mostly end their careers once their pregnancy starts. The reason was clearly discussed in this study, and that was the hurdles from people and their organizations. The results of the current research study shows that it is important to have proper polices for the women athlete that works during pregnancy. Moreover, it also shows that the sports organization of turkey is trying to overcome this issue for women athletes.

6. CONCLUSION

The current research study was conducted to see how women athletes get affected due to gestational diabetes mellitus. The study conducted a screening test of women athletes suffering from gestational diabetes mellitus in Turkey. The objectives of the study were to determine the complications faced by women athletes during pregnancy. The study also conducted a thematic analysis for the women athlete. The data was collected from the women athletes of Turkey. The thematic analysis showed that the women athletes still suffer from complications during pregnancy due to gestational diabetes mellitus. It also shows that even after so many advancements and technology, still women athletes have to face the issue of gestational diabetes mellitus. The research study showed that the issue is not just limited to their health and training but also to the sports organizations. One of the biggest problems faced by women athletes during pregnancy and gestational diabetes mellitus is that the sports organizations do not show their support towards them. Rather organizations and people suggest them to quit their jobs. The discussion revealed that only in recent times, the sports organizations are becoming aware of the fact that the health of women athletes are also their responsibility. The current research study described how with the passage of time, this thought has changed that women cannot exercise during pregnancy. Even some recent researches show that proper and manageable exercises can help women and baby to be healthy. It can even reduce the risks caused by gestational diabetes mellitus. The current research study has its contribution in the existing literature. It is beneficial for the health sector

and for the sports organization. It can help women suffering from gestational diabetes mellitus also.

7. RESEARCH IMPLICATIONS

This study has helped highlight the health-related issues of GDM among women athletes, which have not been discussed in past research. Therefore, the current study holds its value in both theoretical and practical terms. For instance, this study has effectively improved the knowledge regarding the issues and challenges women athletes face during their pregnancy. In this regard, the social and discriminatory factors have also been highlighted, which can encourage future research to focus on other socioeconomic and cultural factors in this regard. Even today, the sports world is largely run by male athletes, and women athletes have to struggle to achieve their aim. This study provides a perfect example, stating that pregnant women athletes with GDM are not provided with effective health-related guidelines from the sports federation, which influences their overall health management and exercise regime, impacting their athletic performance. Most women athletes are often pressured to quit or take a break from their athletic careers, leading to inadequate outcomes. Therefore, the present study has also effectively highlighted the incorporation of gender disparities in the sports world.

Along with its contribution to the literature, the present study has also been effective in presenting important practical implications considered crucial to promote the value of the current study. For instance, the results obtained from this study can effectively encourage sports organizations to develop and provide important gender-based health-related guidelines to ensure the safety of both men and women athletes. This will help develop and promote a safe and healthy sports environment for all athletes. This study can also be effective in encouraging different health management facilities to develop and implement important diet and exercise plans for women athletes as their bodies respond differently to pregnancy and GDM than normal women. This approach will provide equal health rights to pregnant women athletes with GDM. Moreover, different policymakers can also be motivated to develop and implement important health-related policies for pregnant women athletes. However, the present study has also been effective in promoting social implications as it has highlighted the health-related rights of women athletes in Turkey, focusing on different challenges and issues that women athletes face during their pregnancy, especially when they are suffering from GMD, that can make things more complicated.

8. LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

The current study involves a few limitations which impact the overall efficacy of this study. Three important limitations observed in this study are explained in this section. First, the current study focused on GDM among women athletes, and no comparison was made with regular pregnant women due to limited resources. Second, no neonatal complications among the athletic women suffering from GDM were observed due to limited data accessibility. Third, this study included a small sample size which largely impacted the integrity of the current study.

Therefore, these limitations can be overcome in future research. For instance, in future studies, an effective comparative analysis can be conducted between athletic and normal women suffering from GDM to better understand the different factors impacting their well-being. Future research can also focus on neonatal complications in pregnant athletic women suffering from GDM; this will help highlight important challenges that athletic women face during pregnancy. Finally, future research should also collect data from a larger population to avoid research bias.

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