

Knowledge and Practices of Female Teachers about Gestational Diabetes in Jizan Province, Saudi Arabia

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Abstract

Aim of Study: To assess the knowledge and practices of female teachers in Jizan Province about gestational diabetes (GD), and to identify factors associated with poor knowledge and practices related to the prevention of GD.

Methods: This study followed an analytical cross-sectional research design conducted in Jizan Province, Saudi Arabia. A total of 300 female teachers were included. The inclusion criteria were being a married, Saudi female teacher, aged 20-52 years, who has at least one-year experience in Jizan Province at the start of data collection, with at least one child. An electronic on-line questionnaire was developed by the researchers. The study questionnaire included participants' personal characteristics, past and family histories of GD and/or diabetes mellitus, in addition to questions to assess their knowledge and practices regarding GD.

Results: The study included 300 female teachers. Their main knowledge gaps about GD were related to timing for screening (58.3%), necessary investigations (50%), its management (31.7%) and repeated pregnancies as a risk factor (24.3%). Participants' healthy practices were physical exercise (53.3%), maintaining a healthy diet (66.7%) and following a diet to prevent being overweight (66.7%). Healthy

practices during pregnancy included checking blood sugar (71%), watching body weight gain (74.7%) and keeping on healthy diets (83.7%). More than one-quarter of participants (29.7%) had poor knowledge, while 34% had poor practices. Participants' knowledge levels differed significantly according to their qualification levels ($p=0.048$), having a family member working in the healthcare field ($p=0.035$), being currently diabetic ($p=0.006$), having a past history of GD ($p<0.001$), and having a positive family history of GD ($p=0.005$). Participants' practice levels differed significantly according to their residence ($p=0.012$), experience in teaching ($p=0.028$), and having a family member in the healthcare field ($p=0.002$). Participants' practice levels differed significantly according to being currently diabetic ($p=0.011$).

Conclusions: Female teachers' knowledge and practices about GD in Jizan Province are suboptimal. Female teachers' knowledge is better among more experienced teachers, those with a higher level of education, in addition to diabetic teachers and those with a family history of diabetes. More experienced teachers, and those with a family history of the GD have the highest level of good practices. The most frequent sources for teachers of information about GD are relatives/friends.

Key Words: Gestational diabetes, diabetes mellitus, knowledge, practices, teachers

Introduction

Gestational diabetes mellitus (GD) is a pregnancy-related disorder characterized by glucose intolerance of variable severity that starts during pregnancy (1, 2). Worldwide, the prevalence of GD ranges between 1% and 28% according to the common screening methods and population characteristics (3). The prevalence of GD showed an increasing trend in several regions of the world, and most prominently in south East Asia (4).

Numerous factors stand behind the increased prevalence of GD, including maternal age, obesity and ethnicity. It has been shown that the increased incidence of GD accompanies the high incidence of type 2 diabetes mellitus in some populations (5). Among the most common risk factors of GD are family history of both GD and being type 2 diabetic (6-8). Moreover, pregnancy-associated weight gain is one of the common modifiable risk factors for GD (9).

In Saudi Arabia, reported prevalence of GD varied from 8% to 19%. A large-scale study in Riyadh City estimated that Saudi Arabia had the highest prevalence of GD (24%) worldwide (10-12). Numerous adverse maternal and neonatal outcomes were reported in association with GD. The Hyperglycemia and Adverse Pregnancy Outcomes (HAPO) study revealed significant associations between adverse pregnancy outcomes and elevated levels of maternal glucose. However, the defined levels beyond which the risk increased have not yet been determined (13, 14). Therefore, early diagnosis of GD is essential to reduce maternal and neonatal morbidity and to aid in the prevention of the development of type 2 diabetes.

Most of the accessible literature relates to the awareness of GD among women in the general population. However, there is an obvious lack of studies concerned with the awareness of GD among female teachers whose influence positively affects their students' personal health care behaviours (15, 16).

Gestational diabetes mellitus screening helps to establish a perfect window for the prevention of DM in two generations. The assessment of knowledge about GD among all women including teachers will help identify the gaps and will enable implementation of strategic interventions for prevention of the disease.

To the best of the researchers' knowledge, no study has been carried out concerning knowledge and practice of female teachers regarding GD in Jizan Province, Saudi Arabia. Therefore, this study aimed to assess knowledge and practices of female teachers in Jizan Province about GD, and to identify factors associated with poor knowledge and practices related to the prevention of GD.

Materials and Methods

This study followed an analytical cross-sectional research design in Jizan Province, Saudi Arabia. Using the Raosoft web-based sample size calculator (Raosoft.com), with a 5% margin of error, 95% confidence level, and 75% response, the minimum sample size was calculated to be 285. However, following a convenience sampling, the sample size for the present study was increased to 300 female teachers in the study setting to increase the power and to compensate for possible missing data.

The inclusion criteria for the present study were being a married Saudi female teacher, aged 20-52 years, who had at least one-year experience in Jizan Province at the start of data collection, and who had at least one child.

Based on a thorough review of relevant literature, an electronic on-line questionnaire was developed by the researchers. It was face-validated by experts in the field of Family Medicine, Diabetology and Obstetrics. Potential participants were invited to participate through social media, such as WhatsApp™ and Facebook™. The study questionnaire included participants' personal characteristics, past and family histories of GD and/or diabetes mellitus as well as questions to assess their knowledge and practices regarding GD.

Data were analysed using the Statistical Package for Social Sciences (IBM, SPSS, version 25.0). Frequencies and percentages were used to summarize study variables. The Chi-square test was used for the bivariate analysis of categorical outcomes. P-values less than 0.05 were considered as statistically significant.

Prior to data collection, ethical approval for this study was obtained from the Jazan Health Ethics Committee (Ethical Approval # 2298). Moreover, permission had been granted by the school managers who were asked to inform teachers about the survey and coordinate the electronic distribution of the questionnaire. A statement explaining the nature and the purpose of the study was included on the first page to obtain participants' informed consent before proceeding to fill out the questionnaire. All data were handled anonymously, were securely saved, and were used for research purposes only.

Results

Table (1) shows that the majority of participants were aged 30-49 years. Most participants were married (77.3%), with 2-3 children (39.3%) or 4-5 children (28.7%). Almost half of participants (49.3%) were living in a city. Three-quarters of participants (75%) were university graduates with a Bachelor Degree, 2.3% had a Masters Degree, while 22.7% had other qualifications (e.g., Diploma, or training certificate after Secondary school). Almost half of participants (48%) had more than 10 years' experience in teaching, while 40.7% had a family member working the healthcare field.

Table 1: Personal characteristics of female teachers in Jizan Province (n=300)

Personal Characteristics	No.	%
Age (in years)		
• 20-29	29	9.7
• 30-39	125	41.7
• 40-49	122	40.7
• 50+	24	8.0
Marital status		
• Single	48	16.0
• Married	232	77.3
• Divorced	14	4.7
• Widow	6	2.0
No. of children		
• 1	71	23.7
• 2-3	118	39.3
• 4-5	86	28.7
• >5	25	8.3
Residence		
• City	148	49.3
• Village	152	50.7
Qualification		
• Bachelor Degree	225	75.0
• Masters Degree	7	2.3
• Others	68	22.7
Experience in teaching		
• 1-5 years	97	32.3
• 6-10 years	59	19.7
• >10 years	144	48.0
A family member working in healthcare field	122	40.7

Table (2) shows that 13.7% of participant female teachers were diabetic, while 15.3% had a past history of gestational diabetes, and 40.3% had a positive family history of gestational diabetes. The majority of participants (95.7%) were aware about gestational diabetes, with their main sources of knowledge being from their relatives or friends (55.3%) The source of knowledge for 16.7% was healthcare providers, and for 8.3% was health education campaigns.

Table 2: Participants' history and knowledge about diabetes (n=300)

Characteristics	No.	%
Current history of diabetes	41	13.7
Past history of gestational diabetes	46	15.3
Family history of gestational diabetes	121	40.3
Awareness about gestational diabetes	287	95.7
Sources of knowledge about gestational diabetes		
• Relatives/Friends	166	55.3
• Physicians	50	16.7
• Social media	44	14.7
• Health education campaigns	25	8.3

Table (3) shows that the main knowledge gaps about gestational diabetes among participants were related to the timing for screening (58.3%), necessary investigations (50%), management of the condition(31.7%) and repeated pregnancies as a risk factor (24.3%).

Knowledge items about gestational diabetes	Incorrect		Correct	
	No.	%	No.	%
Repeated pregnancies is a risk factor for GD	73	24.3	227	75.7
Regular antenatal care visits are important for detecting GD	5	1.7	295	98.3
Obesity is a risk factor for GD	15	5.0	285	95.0
Positive family history is a risk factor for GD	40	13.3	260	86.7
Rapid weight gain during pregnancy is a risk factor for GD	24	8.0	276	92.0
Untreated GD affects a pregnant woman's health?	4	1.3	296	98.7
GD a risk factor for type 2 diabetes	13	4.3	287	95.7
GD disappears after delivery?	24	8.0	276	92.0
Untreated GD affects baby's health?	17	5.7	283	94.3
GD can be prevented by healthy diets and exercise	4	1.3	296	98.7
Best timing for screening GD	175	58.3	125	41.7
Investigations done to detect GD	150	50.0	150	50.0
Plan for management of GD	95	31.7	205	68.3

Table (4) shows that participants' healthy practices related to the prevention of gestational diabetes were physical exercise (53.3%), maintaining a healthy diet (66.7%) and following a diet to prevent being overweight (66.7%). Healthy practices during pregnancy included checking blood sugar levels(71%), monitoring body weight gain (74.7%) and maintaining a healthy diet (83.7%).

Table 4: Participants' healthy practices regarding prevention of gestational diabetes (GD)

Practices	No.	%
Practice of regular physical exercise	160	53.3
Keeping on healthy diets	200	66.7
Following a diet to prevent overweight	200	66.7
Keeping on healthy diets during pregnancy	251	83.7
Checking blood sugar during pregnancy	213	71.0
Watching body weight gain during pregnancy	224	74.7

Table (5) and Figure (1) show that 29.7% of participants had poor knowledge regarding gestational diabetes, while 34% had poor practices regarding its prevention.

Table 5: Participants' knowledge and practice levels regarding gestational diabetes (GD)

Levels	No.	%
Knowledge		
• Poor	89	29.7
• Good	211	70.3
Practice		
• Poor	102	34.0
• Good	198	66.0

Figure 1: Participants' knowledge and practice levels regarding gestational diabetes



Table (6) shows that participants' knowledge levels differed significantly according to their qualification levels ($p=0.048$), with the highest percentage of poor knowledge among those with other qualifications (58.8%). Moreover, participants with a family member working in the healthcare field had a significantly higher knowledge level than those with no family member working in the healthcare field (77% and 65.7%, respectively, $p=0.035$). However, participants' knowledge levels did not differ significantly according to their age group, marital status, number of children, residence or their experience in teaching.

Table 6: Participants' knowledge levels about gestational diabetes according to their personal characteristics

Personal Characteristics	Poor (n=89)	Good (n=211)	P-value
Age (in years)			
• 20-29	9 (31.0%)	20 (69.0%)	0.555
• 30-39	37 (29.6%)	88 (70.4%)	
• 40-49	33 (27.0%)	89 (73.0%)	
• 50+	10 (41.7%)	14 (58.3%)	
Marital status			
• Single	17 (35.4%)	31 (64.6%)	0.808
• Married	66 (28.4%)	166 (71.6%)	
• Divorced	4 (28.6%)	10 (71.4%)	
• Widow	2 (33.3%)	4 (66.7%)	
No. of children			
• 1	26 (36.6%)	45 (63.4%)	0.352
• 2-3	29 (24.6%)	89 (75.4%)	
• 4-5	27 (31.4%)	59 (68.6%)	
• >5	7 (28.0%)	18 (72.0%)	
Residence			
• City	43 (29.1%)	105 (70.9%)	0.819
• Village	46 (30.3%)	106 (69.7%)	
Qualification			
• Bachelor Degree	60 (26.7%)	165 (73.3%)	0.048†
• Masters Degree	1 (14.3%)	6 (85.7%)	
• Others	28 (41.2%)	40 (58.8%)	
Experience in teaching			
• 1-5 years	33 (34.0%)	64 (66.0%)	0.145
• 6-10 years	21 (35.6%)	38 (64.4%)	
• >10 years	35 (24.3%)	109 (75.7%)	
A family member working in healthcare field			
• No	61 (34.3%)	117 (65.7%)	0.035†
• Yes	28 (23.0%)	94 (77.0%)	

† Statistically significant

Table (7) shows that participants' knowledge levels about gestational diabetes differed significantly according to whether they were currently diabetic ($p=0.006$), had a past history of gestational diabetes ($p<0.001$), and had a positive family history of gestational diabetes ($p=0.005$). However, participants' knowledge about gestational diabetes did not differ significantly according to their sources of knowledge about gestational diabetes.

Table 7: Participants' knowledge levels about gestational diabetes according to their history, and sources of knowledge about diabetes

Characteristics	Poor (n=89)	Good (n=211)	P-value
Current history of diabetes			
• No	85 (32.4%)	177 (67.6%)	0.006†
• Yes	4 (30.3%)	34 (89.5%)	
Past history of GD			
• No	87 (34.3%)	167 (65.7%)	<0.001†
• Yes	2 (4.3%)	44 (95.7%)	
Family history of GD			
• No	64 (35.8%)	115 (64.2%)	0.005†
• Yes	25 (20.7%)	96 (79.3%)	
Sources of personal knowledge about GD			
• Relatives/Friends	51 (30.7%)	115 (69.3%)	0.308
• Physician	9 (18.0%)	41 (82.0%)	
• Social media	14 (31.8%)	30 (68.2%)	
• Health education campaign	6 (24.0%)	19 (76.0%)	

† Statistically significant

Table (8) shows that participants' practice levels differed significantly according to their residence, with higher percentage of poor knowledge living in villages compared to those living in cities (40.8% and 27%, respectively, $p=0.012$). Moreover, participants with the highest experience in teaching had significantly the highest good practices ($p=0.028$). In addition, participants with a family member in the healthcare field had significantly higher good practice than those with no family member in the healthcare field (76.2% and 59%, respectively, $p=0.002$). However, participants' practice levels did not differ significantly according to their age group, marital status, number of children, or their qualification levels.

Table 8: Participants' practice levels according to their personal characteristics

Personal Characteristics	Poor (n=102)	Good (n=198)	P-value
Age (in years)			
• 20-29	11 (37.9%)	18 (62.1%)	0.203
• 30-39	50 (40.0%)	75 (60.0%)	
• 40-49	35 (28.7%)	87 (71.3%)	
• 50+	6 (25.0%)	18 (75.0%)	
Marital status			
• Single	17 (35.4%)	31 (64.6%)	0.788
• Married	80 (34.5%)	152 (65.5%)	
• Divorced	4 (28.6%)	10 (71.4%)	
• Widow	1 (16.7%)	5 (83.3%)	
No. of children			
• 1	24 (33.8%)	47 (63.4%)	0.968
• 2-3	39 (33.1%)	79 (66.9%)	
• 4-5	31 (36.0%)	55 (64.0%)	
• >5	8 (32.0%)	17 (68.0%)	
Residence			
• City	40 (27.0%)	108 (73.0%)	0.012 [†]
• Village	62 (40.8%)	90 (59.2%)	
Qualification			
• Postgraduate	1 (14.3%)	6 (85.7%)	0.221
• Others	28 (41.2%)	40 (58.8%)	
• University	73 (32.4%)	152 (67.6%)	
Experience in teaching			
• 1-5 years	40 (41.2%)	57 (58.8%)	0.028 [†]
• 6-10 years	24 (40.7%)	35 (59.3%)	
• >10 years	38 (26.4%)	106 (73.6%)	
Healthcare field member at home			
• No	73 (41.0%)	105 (59.0%)	0.002 [†]
• Yes	29 (23.8%)	93 (76.2%)	

† Statistically significant

Table (9) shows that participants' practice levels about gestational diabetes differed significantly according to being currently diabetic ($p=0.011$). However, participants' practices related to gestational diabetes did not differ significantly according to their past history of gestational diabetes, family history of gestational diabetes or their sources of knowledge about gestational diabetes.

Table 9: Participants' practice levels about gestational diabetes according to their history, and sources of knowledge about diabetes

Characteristics	Poor (n=102)	Good (n=198)	%
Current history of diabetes			
• No	96 (36.6%)	166 (63.4%)	0.011†
• Yes	6 (15.8%)	32 (84.2%)	
Past history of GD			
• No	91 (35.8%)	163 (64.2%)	0.117
• Yes	11 (23.9%)	35 (76.1%)	
Family history of GD			
• No	64 (35.8%)	115 (64.2%)	0.435
• Yes	38 (31.4%)	83 (68.6%)	
Sources of personal knowledge about GD			
• Relatives/Friends	53 (31.9%)	113 (68.1%)	0.933
• Physician	16 (32.0%)	34 (82.0%)	
• Social media	16 (36.3%)	28 (63.6%)	
• Health education campaign	9 (36.0%)	16 (64.0%)	

† Statistically significant

Discussion

Teachers are the cornerstone of the next generation and they constitute an important source of health information for students about diabetes. Implementing a public health approach to diabetes prevention in a specific group of the community such as school teachers, requires assessing their knowledge, and practice and identifying the associated factors (17).

The present study showed that almost all female teachers in Jazan City, included in the study group, were aware about GD. However, more than one-quarter had poor knowledge, with knowledge gaps related to the timing for screening, the necessary investigations, management of the condition and risk factors, such as repeated pregnancies. Predictors of good knowledge levels about GD included having a Bachelor or Masters Degree, having a family member working in the healthcare field, being currently diabetic, and having a past, or a family history of GD.

These findings are in accordance with those reported by several studies. Ogu et al. (18) reported that about two-thirds of women of reproductive age in Southern Nigeria had poor knowledge about GD, in terms of its risk factors, screening, diagnosis and treatment, and potential complications.

In Spain, Gutierrez-Manzanedo et al. (19) reported that 36.9% of the surveyed teachers had sufficient basic knowledge about diabetes.

In Saudi Arabia, Aldekhayel (17) reported more than half of teachers in Riyadh City were knowledgeable about diabetes mellitus. However, knowledge gaps were reported in some important aspects of the disease, such as fasting blood glucose cut-off level to diagnose diabetes, its complications and risk factors. In Al-Jouf Region, Duraywish (20) a study reported that school teachers had adequate general knowledge about diabetes mellitus.

Moreover, Aldekhayel et al. (17) reported that more educated and more experienced teachers expressed a higher level of knowledge than other less educated or experienced teachers. The study of Salem et al. (21) in Riyadh, Saudi Arabia showed that knowledge about diabetes was significantly higher among diabetics than non-diabetics.

Our study revealed that friends and relatives were their main source of knowledge about GD for more than half of participants, while healthcare providers were the source of knowledge for only 16.7%, and health education campaigns were the source of knowledge for 8.3% of participants. Similarly, Ogu et al. (18) in Nigeria, reported that the main sources of knowledge of GD among participant women of reproductive age were their friends, healthcare workers, and mass media. Aldekhayel et al. (17), noted in Saudi Arabia that the highest level of knowledge was shown in teachers who reported that their source of information was medical book/scientific journals, health educators, and physicians. However, Salem et al. (21) observed that the role of healthcare professionals represented a minimal contribution toward diabetes-relevant knowledge.

Aldekhayel et al. (17) argued that knowing the source of the participants' information is useful in specifying the most appropriate method for health education to increase the teachers' knowledge and improve their healthy practices. The most frequent sources of information about diabetes were relatives/friends, social media, the internet, physicians, and awareness campaigns. This shows how important it is to obtain health-related information from scientific literature and healthcare professionals. Also this stresses the importance of having a reliable trusted source of information for teachers, which will help improve their knowledge levels as well as make teachers more confident to share and apply their knowledge. Healthcare professionals should be encouraged to have more active roles in raising the level of health-related knowledge in the community.

The good knowledge levels about GD among almost three-quarters of our study sample may be attributed to the high prevalence of diabetes in the Saudi community, as well as the high educational level of the study population, where most participants were university graduates, and some had attained a Masters Degree. However, the comparison between different studies may not be applicable due to use of different tools and cut-off levels in assessing participants' knowledge. Nevertheless, because of the generally observed low to moderate levels of knowledge levels about diabetes, several studies strongly recommended that it is necessary to provide training programmes for teachers to increase their knowledge about different types of diabetes (22-23).

The present study showed more than one-third of participants had poor practices regarding GD prevention. Predictors of good practices included urban residence, more experience in teaching and having a family member in the healthcare field, in addition to being currently diabetic.

These findings are in accordance with those of Aldekhayel et al. (17), who found that diabetic teachers and those with a family history of diabetes performed more healthy practices than non-diabetic teachers, and those with no family history of diabetes. Moreover, Ogu et al. (18) reported that urban residence predicted good overall knowledge and practices of GD. They explained that residence in an urban community likely provides more exposure to information about GD, in addition to access to higher levels of health care.

Aldekhayel (17) added that teachers who reported practicing healthy eating habits, were non-smokers, and regularly measured their weight and height. The factors associated with good practice were having longer teaching experience, having a family history of diabetes, and being diabetic. They also reported that those with less teaching experience had the least practice level. Therefore, targeting newly appointed teachers should be a high priority when developing a diabetes education programme for teachers. Moreover, new young teachers should be targeted because they are usually keener to learn, and they have a longer time before reaching their retirement

age to use the knowledge in their work.

Gutierrez-Manzanedo et al. (19) emphasized that focusing on increasing diabetes-related knowledge among teachers will help them lead healthy lifestyles, and will enforce their role in supporting diabetics. Therefore, there should be a continuous education and counselling activities for Saudi teachers to encourage them to have a higher level of knowledge.

Study Strengths and Limitations

Our findings provide the impetus for a largescale community mobilization and education activities to ensure improved knowledge among women of reproductive age, and their partners, as an important first step toward creating demand for GD screening services at the health facilities serving these women. However, this study is limited by its cross-sectional design, which just proves association but not causality between the studied dependent and independent variables. Another limitation is the subjective nature of participants' responses.

Conclusions

Female teachers' knowledge and practices about GD in Jizan Province are suboptimal. About one-quarter of teachers have poor knowledge about GD. Female teachers' knowledge is better among more experienced teachers, those with a higher level of education, in addition to diabetic teachers and those with a family history of diabetes. About two-thirds of teachers have good diabetes-related practice toward prevention of GD. In addition, more experienced teachers and those with a family history of the GD have the highest level of good practices. Therefore, targeting new teachers should be a priority in order to raise their knowledge and practice levels regarding GD. The most frequent sources of information for teachers about GD are their relatives/friends. Therefore, having a reliable trusted source of information about GD for teachers will be beneficial to improve their knowledge. Finally, healthcare workers should be encouraged to participate and play a higher role in raising the level of teachers' knowledge about diabetes in general and GD in particular.

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