Research Article

# A descriptive retrospective study of ophthalmic care during pregnancy at Al Baha Province, Saudi Arabia

**Ali Hendi Alghamdi**

Department of Surgery, Ophthalmologist, Faculty of Medicine, Al Baha University, Saudi Arabia

**Correspondence to:** Ali Hendi Alghamdi, E-mail: alihen310@gmail.com

**Received:** August 11, 2018; **Accepted:** August 30, 2018

## ABSTRACT

**Background:** The eye is considered as the mirror for the human body, and its examination can reflect many signs of systemic diseases. Pregnancy is associated with many physiological changes in the eyes that should be considered by all caring physicians to optimize the medical care for the pregnant lady. **Objectives:** This study aimed to determine the current status of the ophthalmic care during pregnancy at the biggest referral hospital in our city; King Fahad Hospital (KFH) at Al Baha, Saudi Arabia, by screening the available records at the obstetric unit, and to monitor the ophthalmic consultations from the obstetricians to the ophthalmologists. **Materials and Methods:** The data were obtained from the records of the antenatal care unit. The data included the records of the pregnant ladies who had their antenatal care and delivery at KFH over 1 year time the period from (January 1, 2015, to December 31, 2015). All these records were reviewed and studied critically in a retrospective manner. The descriptive study including the mean and standard deviation was done by SPSS version 17. **Results:** The total numbers of pregnancies seen in the antenatal clinics were 5325, among them 214 patients were diabetic (26 were of type 1 diabetes and 188 were gestational diabetes mellitus) and 174 were hypertensive (44 patients with chronic hypertension [HTN] and 130 patients were gestational induced HTN). No single consultation or ophthalmic care documentations founded in the studied group files. **Conclusion:** In hospitals where obstetric care is provided, strong collaboration between obstetricians and ophthalmologist is mandatory to implement a clear protocol and guidelines for eye care during pregnancy.

**KEY WORDS:** Diabetes; Hypertension; Gestational Diabetes; Ophthalmological Care; Antenatal Care

## INTRODUCTION

A lot of physiological changes occur during pregnancy affect the function of the eye potentially,[1] moreover, at the same time pregnancy also may affect pre-existing conditions,[2-4] which may lead to vision impairment and blindness.[5] Increasing risks for developing diabetes and cardiovascular diseases in women with previous gestational diabetes mellitus (GDM) were reported in the literature.[6] Many reports in Saudi Arabia call to establish structured programs that address the needs and demands of the population at different age groups. These programs will target as well as pregnant ladies.[7]

Many physiological changes were reported in pregnant women as corneal changes due to water retention which includes an alteration in the corneal sensitivity, corneal thickness, and curvature. These changes were reported later in pregnancy and may generate transient refraction errors, in which the pregnancy is considered as a contraindication to refractive eye surgery. Furthermore, contact lens intolerance has been encountered, so it is sensible to holdup prescribing new corrective lenses waiting several weeks postpartum. In addition, pregnancy may give rise to dry-eye syndrome due to damage to lacrimal acinar cells. A recently developed

| Access this article online | |
|---|---|
| **Website:** http://www.ijmsph.com | Quick Response code |
| **DOI:** 10.5455/ijmsph.2018.0823530082018 | |

Krukenberg spindles, not associated with other signs of pigment dispersion, have been noticed in the first trimester which usually decreases during the third trimester and postpartum. In addition to corneal changes, intraocular pressure (IOP) variations have been observed particularly in the second and third trimester.[1] Possible explanations for these changes include alteration in episcleral venous pressure/ aqueous outflow, diminishing scleral rigidity, and systemic acidosis encountered during pregnancy. Furthermore, ocular adnxeal changes and ptosis may develop.[2]

In pregnancy–specific eye disease as preeclampsia and eclampsia, visible retinal vascular changes and visual symptoms were found in 40–100 and 25–50% in preeclamptic patients, respectively. The visual symptoms include blurred vision, scotoma, photopsia, diplopia, visual field defects, and ended by blindness.[3,4] The most common ocular finding is constriction or spasm of retinal arterioles, with a decreased retinal artery to vein ratio correlating with severity, diffuse retinal edema, hemorrhages, exudates, and cotton-wool spots. Many possible explanations for these changes were constructed which encounter endothelial damage, hormonal changes, hypoperfusion, and synchronized systemic vascular disease.[5]

Furthermore, wide verities of ocular abnormalities were noticed in preeclampsia and eclampsia which include papillophlebitis, white centered retinal hemorrhages, macular edema, Elschnig spots, retinal pigment epithelial (RPE) lesions, optic neuritis and atrophy, ischemic optic neuropathy, retinal artery and vein occlusion, exudative retinal detachment, and cortical blindness.[5,6]

In addition, central serous chorioretinopathy (CSCR) was reported which results in an accumulation of subretinal fluid that leads to a circumscribed neurosensory retinal detachment in the macula at the level of the RPE. White fibrous subretinal exudates are often associated with CSCR of pregnancy. Furthermore, pregnant women are prone to develop occlusive vascular disorders due to arteriolar obstruction by complement-induced leukocyte aggregation has been found in the postpartum period. It may be associated with hypercoagulability, pancreatitis, and amniotic fluid emboli. Typical presentation includes severe bilateral visual loss presently after delivery, with widespread cotton-wool spots.[6,7]

In pre-existing eye diseases, as diabetic retinopathy (DR), while most of the studies have shown pregnancy is considered an independent risk factor for aggravation of DR, the incidence of gestational diabetes in the absence of pre-existing diabetes does not seem to increase the risk for DR. Many risk factors have been found to worsen the DR in pregnant women. These factors include hypertension (HTN), diabetes of long duration before pregnancy with bad management of diabetes especially in pre and during pregnancy. In chronic noninfectious uveitis, pregnancy seems to grant a beneficial effect, with a lower occurrence of flare-ups due to immunomodulatory and hormonal effects. In addition, latent ocular toxoplasmosis may reactivate during pregnancy, with an insignificant risk to the fetus of acquiring congenital toxoplasmosis.[7,8]

The pregnancy effect on eyes may involve different body site such as significant changes occur in the peripheral blood circulation[8] and to more significant level main two medical problems; DM and HTN were with great effects. Pregnancy represents a risk factor in the evolution of retinal changes in diabetic patients,[9] besides, HTN affect the eye in different directions during pregnancy; such as visual loss due to severe retinal diseases particularly retinal vascular occlusion on both artery and vein, retinal arteriolar emboli, macroaneurysm, ischemic optic neuropathy and glaucoma,[10-12] and even the offspring microvascular structure-insights from the retinal microcirculation will affected.[13]

On the other hands, pre-eclampsia and pregnancy-induced HTN are associated with severe DR in type 1 diabetes later in life. In addition, women with type 1 diabetes and a hypertensive pregnancy have an increased risk of severe DR later in life.[14]

The pregnant women required care and consultations in many directions, such as monitoring of diabetic and hypertensive patients during the pregnancy is strongly recommended. Moreover, a policy that will encourage regular eye care services during pregnancy is highly required.[15] It is known that some certain drugs administration may induce serious eye complications and malformation during pregnancy such as carbamazipine.[16] Many driving factors require the needs of primary health-care during pregnancy to avoid serious complications.[17-20]

On the other hands, some conditions require ophthalmologic referral to avoid serious complications, and even vision loss[21,22] while a few protocols were available regarding the ophthalmic referral during pregnancy worldwide.

All around the world, there were a lot of guidelines available dealing with eye care during pregnancy such as American, UK,[23,24] German clinical practice,[25] Canadian,[26] Australia[27] Mexican,[28] and India[29] while literature revealed no Arabic ones.

According to the above-mentioned ocular complications occurred during pregnancy, the aim of the study is to stand on the role of antenatal care unit in the prevention of ocular problems. Although large number of pregnant ladies need ophthalmic care, there is no clear collaborative protocol, or obvious referral channels between obstetricians and ophthalmologist are exist, which, in turn, reversely may affect the ophthalmic health status of the pregnant ladies at Al Baha Hospitals, Saudi Arabia.

## MATERIALS AND METHODS

The study was done after obtaining the ethical permission from the authorities of King Fahad hospital (KFH) and after following the local ethical guidelines which regulate the policy of investigation and research. The study is cross-sectional, descriptive, retrospective, hospital-based, conducted at KFH at Al Baha, Saudi Arabia. All the hospital records for pregnant ladies attended the obstetric department were screened for the study issue; with emphasis on the ophthalmic problems. All pregnant ladies who were booked in the first or second trimester and completed regularly their antenatal care and delivery in the hospital were included in the study. A total number of 5,325 pregnant ladies were enrolled in the study, where the evaluated aspects include; the habit of referral to an ophthalmologist, ophthalmic consultations, and the collaborative protocol between obstetricians and ophthalmologists regarding the pregnant-ophthalmic issues. Cases with high risk to develop ophthalmic problems during pregnancy such as diabetic (DM) and hypertensive (HTN) mothers were segregated and studied separately. The data were collected from the records in special forms that designed to suit the statistical analysis. Each case was numbered, and its data were coded and entered into SPSS software program for results analysis. Descriptive statistics were measured which include mean, standard deviation, and standard error of mean and each data were analyzed by measuring frequency and distribution percentage and expressed in graphical manner. Simple bars were used for the description of frequency distribution of certain data. The data are displayed using charts in figures below showed the most important characteristics related to the diseases commonly associated with the ophthalmologic problems encountered by the pregnant ladies in the studied hospital.

## RESULTS

This descriptive study revealed that 7.3% ($n$ = 388 out of 5325) of the pregnant ladies at the obstetrics and gynecology unit at KFH have either DM or HTN [Figure 1]. Both the DM and HTN distributed among the pregnant ladies attending KFH with DM a little bit more than HTN [Figure 2]. The DM associated with pregnancy represents the major problem (87.9%) among the ladies in KFH comparable to the insulin-dependent DM (IDDM) [Figure 3]. Regarding HTN, the pregnancy-induced HTN represent the major problem (74.7%) among the ladies in KFH comparable to the chronic one [Figure 4]. All these data are expressed in Table 1.

## DISCUSSION

A large number of pregnant women need ophthalmic care, which represents a great medical challenge. Besides the physiological changes or complications of the eye that may be associated with the pregnancy, other manifestations may be augmented especially of preexisting diseases as DM and

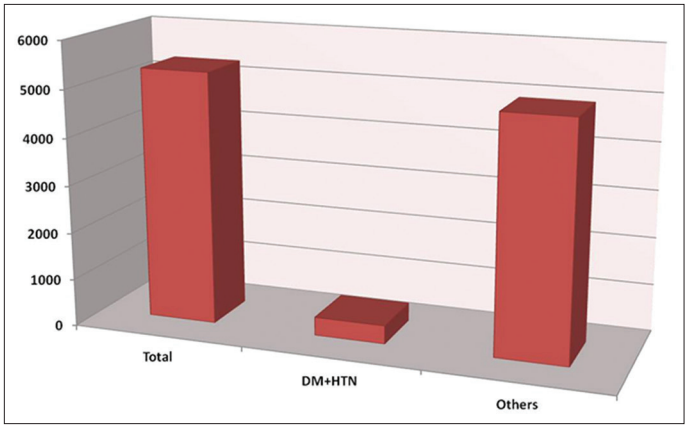


**Figure 1:** The frequency distribution of the pregnant ladies attending the obstetrics and gynecology unit at King Fahad Hospital during the study period, data showed the proportion percentage of the diabetes mellitus and hypertension among the total ladies

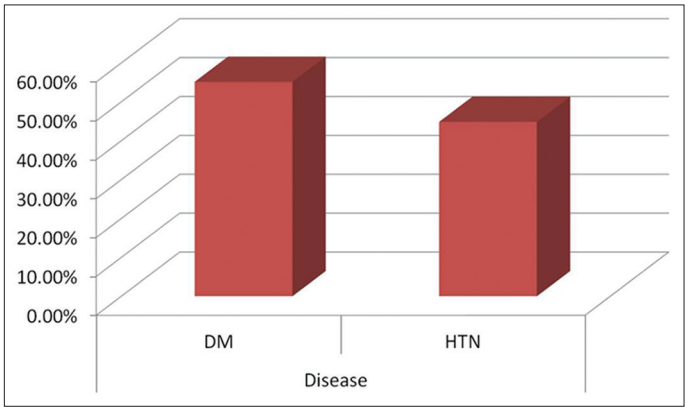


**Figure 2:** The frequency distribution of the two main diseases associated with ophthalmic problems during the pregnancy. Data obtained from the hospital records of the obstetrics and gynecology unit at King Fahad Hospital

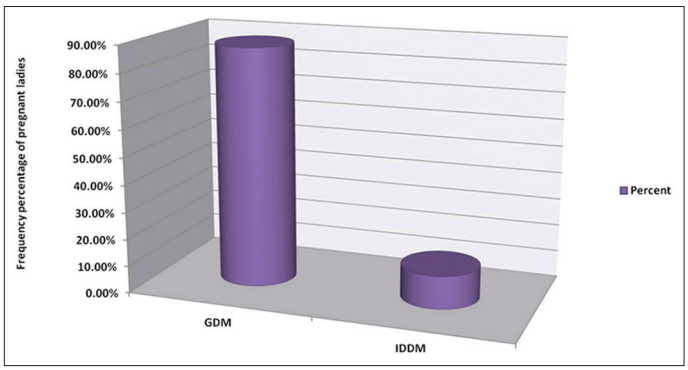


**Figure 3:** The frequency distribution of the two main types of diabetes mellitus among the pregnant ladies. Data obtained from the hospital records of the obstetrics and gynecology unit at King Fahad Hospital

HTN. No enough data regarding ophthalmic care during pregnancy is encountered in Al Baha province, Saudi Arabia.

The present study is considered the first one in Al Baha province which studied the impact of ophthalmic care during

pregnancy in the antenatal care unit of KFH. The results obtained from the current study revealed that 388 out of 5325 (7.3%) of the pregnant women attending the antenatal care unit at KFH, obstetrics and gynecology departments were either diabetic or hypertensive, The DM cases associated with pregnancy were 87.9% compared to the IDDM [Figure 3]. The pregnancy-induced HTN cases were 74.7% compared to the chronic one.

This indicates that a significant number of pregnant ladies needs special eye cares especially those of DM. This is in agreement with Ghanchi[23] who suggested that all adult diabetic patients should do initial eye screening at the time of diagnosis and at least annually afterward and this group was categorized as Level A. It is intended to improve recognition of cases with sight retinopathy. Children and adults with Type I DM should do dilated fundus photography at least annually from the age of 12, whereas those with Type II DM and history of gestational diabetes should do dilated fundus photography once a year from diagnosis (Level B). Furthermore, it is in concordance with Shotliff and Duncan[24] who concluded that the accomplishment of national diabetes retinal screening program is associated with a lower proportion of patients referred to ophthalmology. In addition, our screening data are in agreement with the international trends where there are special practical guidelines that governed these issues as those applied by Ziemssen *et al*.,[25] Hooper *et al*.,[26] McCarty,[27] and others.[28-30]

In the present study, the main common diseases, DM and HTN associated with severe eye-problems were found to some extent, equally distributed among the pregnant ladies at KFH, with slight increase in DM while other studies in Asia and western countries support our results.[31,32] Among the diabetic pregnant women at Al Baha, the majority were found to be the gestational type (3.5%) rather than other; this coincides with the Feig *et al*.[33] who did a Canadian study and revealed that the incidence of both GDM and pre-GDM in pregnancy has doubled over the past 14 years, and generally the burden of diabetes in pregnancy on the society is a fast growing. Furthermore, they reported that congenital anomaly rates have decreased in women with diabetes, while perinatal mortality rates remain unchanged, and the risk of both remains significantly elevated compared with nondiabetic women. They recommended that efforts must be increased to diminish these undesirable outcomes.[33] Furthermore, our data are in concordance with the study of Al-Rowaily and Abolfotouh[34] that investigated the prevalence of GDM in Riyadh, Saudi Arabia and found the occurrence of GDM was 12.5% and 3.8% by the World Health Organization and American Diabetes Association criteria, respectively. Furthermore, they found that the prevalence among multiparous women was 8.29 times more prone to develop GDM than nulliparous women. This may be due to the bewildering effect of maternal age.[34] Wahabi *et al*.,[35] studied maternal and perinatal outcomes in King Khalid University Hospital, Saudi Arabia and found that out of 3041 women who delivered during the study period, 569 (18.7%) had GDM and 2472 (81.3%) were not diabetic.

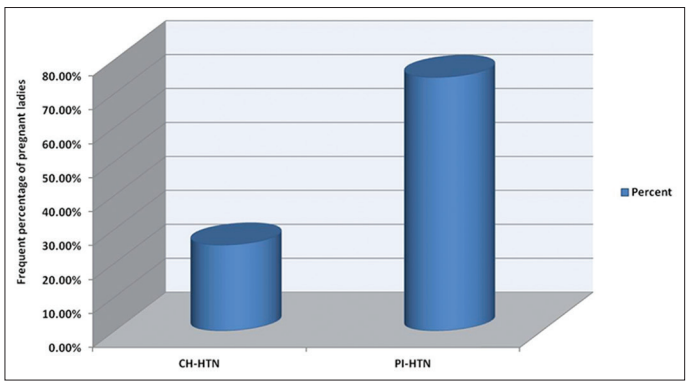


**Figure 4:** The frequency distribution of the two main types of hypertension among the pregnant ladies. Data obtained from the hospital records of the obstetrics and gynecology unit at King Fahad Hospital

On the other hands, our findings revealed that 3.3% ($n$ = 174) of pregnant ladies were hypertensive; 25.3% ($n$ = 44) of them were of chronic HTN who are represent 0.8% of the total pregnancies, while 74.7% ($n$ = 130) are of gestational HTN, who represent 2.4% of total pregnancies, our results were not far away from the global epidemiological studies worldwide. [33,36-48] Surprisingly, diabetes and HTN during pregnancy are complementary to each other; usually, they cannot be studied separately, studies in Saudi Arabia stated that gestational diabetes and HTN during pregnancy can increase a woman's risk of developing type 2 diabetes. In the other hands, good blood sugar control reduces the risk of high blood pressure, pre-eclampsia, and other potentially serious pregnancy complications and prevents complications for baby.[35]

Several challenges in diabetes management need to be tackled in Saudi Arabia as the growing prevalence and

**Table 1:** Table illustrate all numerical data and its percentage in the current study

| Total cases (5325) | DM (%) | HTN (%) | Types of hypertension (%) | Types of DM (%) |
|---|---|---|---|---|
| DM+HTN | | | | |
| 388 | 55.15 | 44.85 | CH-HTN (25.3) | GDM (87.9) |
| Others | | | | |
| 4937 | | | PI-HTN (74.7) | IDDM (12.1) |

GDM: Gestational diabetes mellitus, DM: Diabetes mellitus, HTN: Hypertension, IDDM: Insulin-dependent diabetes mellitus

poor awareness; thus, it is crucial to implement improved health-care protocols.[49] In addition, insufficient training of practitioners; lack of educators and no existing evaluation of their outputs are documented.[50]

In our study, many issues and complaints which are frequently encountered during pregnancy such as dry eye syndrome, refractive errors changes, IOP control in glaucoma patient, contact lens use, and chronic eye diseases were not evidently addressed for any pregnant lady in the studied hospital.

In spite of all above alarmed results, that stress on the critical health situation of pregnant women concerning eye care, especially pregnant ladies with DM, HTN, and chronic eye diseases, both literature and practice of pregnant ladies eye care is very deficient, no clear Saudi guidelines of eye care for diabetic and hypertensive pregnant women, as well as absence of collaboration between eye care providers and pregnant women health providers.

## CONCLUSION

No clear referral guidelines were observed regarding the ophthalmic care during pregnancy in the studied hospital in Al Baha. Furthermore, no consultations were done among the study populations for ophthalmic problems, while there was no collaborative protocol between the obstetricians and the ophthalmologist that covered the shared clinical cases. Finally, in hospitals where obstetric care is provided, strong collaboration between obstetricians and ophthalmologist is mandatory to implement a clear protocol and guidelines for eye care during pregnancy.

## REFERENCES


1. Gotovac M, Kastelan S, Lukenda A. Eye and pregnancy. Coll Antropol 2013;37 Suppl 1:189-93.
2. Grant AD, Chung SM. The eye in pregnancy: Ophthalmologic and neuro-ophthalmologic changes. Clin Obstet Gynecol 2013;56:397-412.
3. Black MH, Zhou H, Sacks DA, Dublin S, Lawrence JM, Harrison TN, *et al.* Hypertensive disorders first identified in pregnancy increase risk for incident prehypertension and hypertension in the year after delivery. J Hypertens 2016;34:728-35.
4. Behrens I, Basit S, Melbye M, Lykke JA, Wohlfahrt J, Bundgaard H, *et al*. Risk of chronic hypertension in women with a history of hypertensive disorders of pregnancy - a nationwide cohort study. J Matern Fetal Neonatal Med 2016;29:21.
5. Centers for Disease C, Prevention. Eye-care utilization among women aged > or =40 years with eye diseases--19 states, 2006-2008. MMWR Morb Mortal Wkly Rep 2010;59:588-91.
6. Krishnaveni GV, Hill JC, Veena SR, Geetha S, Jayakumar MN, Karat CL, *et al.* Gestational diabetes and the incidence of diabetes in the 5 years following the index pregnancy in South Indian women. Diabetes Res Clin Pract 2007;78:398-404.
7. Alnuaim A. Rising prevalence of diabetes mellitus in Saudi Arabia: Cause for concern and call for urgent control program. Ann Saudi Med 2014;34:463-4.
8. Horven I, Gjonnaes H, Kroese A. Blood circulating changes in the eye and limbs with relation to pregnancy and female sex hormones. Acta Ophthalmol (Copenh) 1976;54:203-14.
9. Neckell A, Munteanu M. Diabetus mellitus and pregnancy. Oftalmologia 2009;53:118-22.
10. Resch M, Süveges I, Németh J. Hypertension-related eye disorders. Orv Hetil 2013;154:1773-80.
11. Ponte F, Giuffré G, Giammanco R, Dardanoni G. Risk factors of ocular hypertension and glaucoma. The casteldaccia eye study. Doc Ophthalmol 1994;85:203-10.
12. Pham MT, Peck RE, Dobbins KR. Nonarteritic ischemic optic neuropathy secondary to severe ocular hypertension masked by interface fluid in a post-LASIK eye. J Cataract Refract Surg 2013;39:955-7.
13. Huckstep O, Lewandowski AJ, Leeson P. Invited commentary: Hypertension during pregnancy and offspring microvascular structure-insights from the retinal microcirculation. Am J Epidemiol 2016;184:616-8.
14. Gutaj P, Zawiejska A, Mantaj U, Wender-Ożegowska E. Determinants of preeclampsia in women with Type 1 diabetes. Acta Diabetol 2017;54:1115-21.
15. Ibraheem WA, Ibraheem AB, Owonikoko M, Tijani A, Olamoyegun MA, AbdSalam S, *et al.* Eye care services utilisation among pregnant women in Nigeria. J Obstet Gynaecol 2016;36:611-4.
16. Afshar M, Moallem SA, Houshang Mohammadpour A, Shiravi A, Majid Jalalian S, Jafar Golalipour M, *et al.* Teratogenic effects of carbamazepine on embryonic eye development in pregnant mice. Cutan Ocul Toxicol 2010;29:10-5.
17. Hernández-Mijares A, Solá-Izquierdo E, Ballester-Mechó F, Marí-Herrero MT, Gilabert-Molés JV, Gimeno-Clemente N, *et al.* Obesity and overweight prevalences in rural and urban populations in East Spain and its association with undiagnosed hypertension and diabetes mellitus: A cross-sectional population-based survey. BMC Res Notes 2009;2:151.
18. Gentles D, Metcalf P, Dyall L, Scragg R, Black P, Schaaf D, *et al.* Blood pressure prevalences and levels for a multicultural population in Auckland, New Zealand: Results from the diabetes, heart and health survey 2002/2003. N Z Med J 2006;119:U2318.
19. DECODE Study Group. Age- and sex-specific prevalences of diabetes and impaired glucose regulation in 13 European cohorts. Diabetes Care 2003;26:61-9.
20. Zheng Y, Cheng CY, Lamoureux EL, Chiang PP, Rahman Anuar A, Wang JJ, *et al.* How much eye care services do Asian populations need? Projection from the singapore epidemiology of eye disease (SEED) study. Invest Ophthalmol Vis Sci 2013;54:2171-7.
21. Weinstock FJ, Weinstock MB. Common eye disorders: Six patients to refer. Postgrad Med 1996;99:107-10, 113-6.
22. McDonald RA. Eye problems in general practice. To refer or not to refer. Aust Fam Physician 1995;24:987-90, 993.
23. Ghanchi F, Diabetic Retinopathy Guidelines Working Group. The royal college of ophthalmologists' clinical guidelines for diabetic retinopathy: A summary. Eye (Lond) 2013;27:285-7.
24. Shotliff KP, Duncan G. Diabetic retinopathy screening programmes and reducing ophthalmologists' workload. Diabet Med 2006;23:449.

25. Ziemssen F, Lemmen K, Bertram B, Hammes HP, Agostini H. National guidelines for treatment of diabetic retinopathy: Second edition of the national guidelines for treatment of diabetic retinopathy. Ophthalmologe 2016;113:623-38.
26. Hooper P, Boucher MC, Cruess A, Dawson KG, Delpero W, Greve M, *et al.* Canadian ophthalmological society evidence-based clinical practice guidelines for the management of diabetic retinopathy. Can J Ophthalmol 2012;47:S1-30, S31-54.
27. McCarty CA, Taylor KI, McKay R, Keeffe JE, Working Group on Evaluation of NHMRC Diabetic Retinopathy Guidelines. Diabetic retinopathy: Effects of national guidelines on the referral, examination and treatment practices of ophthalmologists and optometrists. Clin Exp Ophthalmol 2001;29:52-8.
28. Chakrabarti R, Harper CA, Keeffe JE. Diabetic retinopathy management guidelines. Expert Rev Ophthalmol 2012;7:417-39.
29. Ahmed RA, Khalil SN, Al-Qahtani MA. Diabetic retinopathy and the associated risk factors in diabetes Type 2 patients in Abha, Saudi Arabia. J Family Community Med 2016;23:18-24.
30. Fauvel JP. Hypertension during pregnancy: Epidemiology, definition. Presse Med 2016;45:618-21.
31. Sullivan SD, Umans JG, Ratner R. Hypertension complicating diabetic pregnancies: Pathophysiology, management, and controversies. J Clin Hyperten 2011;13:275-84.
32. Rajput R, Yadav Y, Nanda S, Rajput M. Prevalence of gestational diabetes mellitus associated risk factors at a tertiary care hospital in Haryana. Indian J Med Res 2013;137:728-33.
33. Feig DS, Hwee J, Shah BR, Booth GL, Bierman AS, Lipscombe LL, *et al.* Trends in incidence of diabetes in pregnancy and serious perinatal outcomes: A large, population-based study in Ontario, Canada, 1996-2010. Diabetes Care 2014;37:1590-6.
34. Al-Rowaily MA, Abolfotouh MA. Predictors of gestational diabetes mellitus in a high-parity community in Saudi Arabia. East Mediterr Health J 2010;16:636-41.
35. Wahabi HA, Esmaeil SA, Fayed A, Alzeidan RA. Gestational diabetes mellitus: Maternal and perinatal outcomes in King Khalid university hospital, Saudi Arabia. J Egypt Public Health Assoc 2013;88:104-8.
36. Kim C, Newton KM, Knopp RH. Gestational diabetes and the incidence of Type 2 diabetes: A systematic review. Diabetes Care 2002;25:1862-8.
37. Zhang J, Zeisler J, Hatch MC, Berkowitz G. Epidemiology of pregnancy-induced hypertension. Epidemiol Rev 1997;19:218-32.
38. Ma R, Liu JM, Li S, Ye RW, Chen H, Xue MJ, *et al.* Study on the descriptive epidemiology of pregnancy-induced hypertension from 1995 - 2000 in Jiaxing of Zhejiang province, China. Zhonghua Liu Xing Bing Xue Za Zhi 2005;26:960-3.
39. Baragou S, Goeh-Akue E, Pio M, Afassinou YM, Atta B. Hypertension and pregnancy in lome (sub-saharan africa): Epidemiology, diagnosis and risk factors. Ann Cardiol Angeiol (Paris) 2014;63:145-50.
40. Hanson U, Persson B. Epidemiology of pregnancy-induced hypertension and preeclampsia in type 1 (insulin-dependent) diabetic pregnancies in Sweden. Acta Obstet Gynecol Scand 1998;77:620-4.
41. Jiang D. China: Epidemiology of pregnancy-induced hypertension. World Health Stat Q 1995;48:8-10.
42. Künzel W. "Goldblatt phenomenon of the uterus" and latent kidney disease as the cause of pregnancy-induced hypertension-epidemiology and therapeutic consequences. Geburtshilfe Frauenheilkd 1990;50:833-41.
43. Lindberg BS. Epidemiology of hypertension during pregnancy. Int J Technol Assess Health Care 1992;8 Suppl 1:57-62.
44. Lambotte R. Pathogenesis of hypertension in pregnancy. Recent ideas on epidemiology. J Gynecol Obstet Biol Reprod (Paris) 1980;9:33-4.
45. Antwi E, Klipstein-Grobusch K, Quansah Asare G, Koram KA, Grobbee D, Agyepong IA, *et al.* Measuring regional and district variations in the incidence of pregnancy-induced hypertension in Ghana: Challenges, opportunities and implications for maternal and newborn health policy and programmes. Trop Med Int Health 2016;21:93-100.
46. Adinegara LA, Razzak MS. Does lifestyle increase the incidence of pregnancy-induced hypertension? Med J Malaysia 2004;59:39-44.
47. Bakker WW, Faas MM. The incidence of pregnancy-induced hypertension and smoking: An alternative explanation? Am J Obstet Gynecol 2007;197:556.
48. Robert AA, Al Dawish MA, Braham R, Musallam MA, Al Hayek AA, Al Kahtany NH, *et al.* Type 2 diabetes mellitus in Saudi Arabia: Major challenges and possible solutions. Curr Diabetes Rev 2017;13:59-64.
49. Alharbi NS, Alotaibi M, De Lusignan S. An analysis of health policies designed to control and prevent diabetes in Saudi Arabia. Glob J Health Sci 2016;8:56657.
50. Report of the National High Blood Pressure Education Program Working Group on High Blood Pressure in Pregnancy. Am J Obstet Gynecol 2000;183:S1-S22.

**How to cite this article:** Alghamdi AH. A descriptive retrospective study of ophthalmic care during pregnancy at Al Baha Province, Saudi Arabia. Int J Med Sci Public Health 2018;7(11):922-927.

**Source of Support:** Nil, **Conflict of Interest:** None declared.