

## Profile of High Risk Pregnancy among Saudi Women in Taif-KSA

<sup>1,2</sup>Samar K. Hafez, <sup>1,3</sup>Laila Sh. Dorgham and <sup>1</sup>Suheir A.M. Sayed

<sup>1</sup>Faculty of Applied Medical Sciences, Taif University, KSA

<sup>2</sup>Faculty of Nursing, Alexandria University, Alexandria, Egypt

<sup>3</sup>National Liver Institute, Menoufia University, Egypt

**Abstract:** A high-risk pregnancy refers to anything that puts the mother, fetus, or neonate at increased risk for morbidity or mortality during pregnancy or childbirth. The current exploratory descriptive study aimed to identify profile of high risk pregnancy among Saudi pregnant women in Taif. Based on Morrison and Olsen High risk scoring tool, a convenient sample of two hundreds Saudi pregnant women scored as being at high risk pregnancy were included in the study subjects, an interview questionnaire also was used for data collection. The results revealed that 44% of Saudi women with high risk pregnancy aged between 30-35 years old (44%) ( $X \pm SD$  33.68 $\pm$ 4.7 years), (60%) of them had obesity. 62% have 5-12 previous pregnancies and approximately half of them (47%) had between 5-11 previous deliveries, 35% had 2 or more previous abortion. About two-thirds (66%) of them had previous complicated pregnancies and 68.7% of them complained of different medical associated conditions during their current pregnancies such as: anemia (25.3%), gestational diabetes (16.2%), pregnancy induced hypertension (15.2%). 40% of them reported exposure to smoking while 22% exposed to pesticide during their current pregnancies. The study recommended proper screening techniques to be used, as well as continuous medical education and in-service training of all primary health care team members about identifying of high risk pregnancy.

**Key words:** Profile • High Risk • Pregnancy

### INTRODUCTION

Every year nearly 5,29,000 women die globally due to pregnancy related causes. For each death nearly 118 women suffer from life threatening events or severe acute morbidity [1, 2]. In KSA, maternal mortality ratio shows no difference or decline between 2008 & 2010 (24/100000 live births) addressing significant problem toward improving maternal health [3].

A high-risk pregnancy refers to anything that puts the mother, fetus, or neonate at increased risk for morbidity or mortality during pregnancy or childbirth. All women must be considered to be at risk [4].

Several risk factors for high risk pregnancy has been identified and including risks that developed as a result of the pregnancy state and risks that were present before pregnancy. Also, multiple pregnancies, maternal age under 18 or over 35 years, pregnancy more than 4 times and interval between pregnancies less than one year, can be considered as risk factors for high-risk pregnancy [5].

Hypertensive disorders of pregnancy seem to be one of the major causes of maternal morbidity and mortality leading to 10-15% of maternal deaths specially in developing world [6]. Pregnancies complicated with hypertensive disorders are associated with increased risk of adverse fetal, neonatal and maternal outcome [7] including preterm birth, intrauterine growth retardation (IUGR), perinatal death, ante partum hemorrhage, postpartum hemorrhage and maternal death [8, 9].

Diabetes mellitus occurs in 3 to 5% of pregnancies, but incidence will probably increase as the incidence of obesity increases. Pregnant women with preexisting insulin-dependent diabetes are at increased risk of pyelonephritis, ketoacidosis, pregnancy-induced hypertension, fetal death, major fetal malformations, fetal macrosomia (Fetal weight > 4.5 kg) and if vasculopathy is present, fetal growth restriction. Multiparous women were 8.29 times more likely to have GDM than nulliparous women. The high rate of GDM among grand multiparas may be due to the confounding effect of maternal age [10].

Obesity during pregnancy is considered a high-risk state because it is associated with many complications. Compared with normal-weight patients, obese patients have a higher prevalence of infertility. Once they conceive, they have higher rate of early miscarriage and congenital anomalies, including neural tube defects [11].

Teenage pregnancy accounts for 13% of all pregnancies. An increased prevalence of anemia, low-birth-weight (LBW) infants, pregnancy-induced hypertension (PIH) and cesarean section was found in young Saudi pregnant women [12- 14]. On the other hand, in pregnant women > 35 years, the incidence of preeclampsia is increased, as is that of gestational diabetes, dysfunctional labor, abruptio placentae, stillbirth and placenta previa [15].

Exposure to common teratogens as infections, smoking, drugs and physical agents may results in malformations especially if exposure occurs between the 2nd and 8th week after conception when organs are forming [16].

Though several studies assessing determinants for high risk pregnancy have been published from developed countries [17], Saudi women have different characteristics (Cultural, religious, socio demographic, sexual behavior and beliefs and contraception practices) than women in developed countries. Therefore the risk factors for high risk pregnancy may differ. This exploratory descriptive cross section study was designed as an attempt to identify profile of high risk pregnancy among Saudi pregnant women in Taif to enable health care providers early identify, effectively prevent, manage women with risk factors which in turn results in decreased incidence of maternal and neonatal mortality.

## MATERIAL AND METHODS

### Material

**Study Design:** An exploratory descriptive cross section study used to identify profile of high risk pregnancy among Saudi women in Taif.

**Settings:** The study was conducted at the obstetrical and gynecological clinics and wards in King Abdul-Aziz Specialist Hospital in Taif.

**Study Subjects:** Pregnant women attending the previously mentioned setting were assessed for being at high or extreme risk pregnancy using Morrison and Olsen High risk scoring tool [18]. Based on the scoring tool, a convenient sample of two hundred of these pregnant

women scored as being at high or extreme risk pregnancy were included in the study subjects while pregnant women scored as being at low risk pregnancy were excluded from the study.

**Tools of Data Collection:** Two tools were used for data collection:

**Tool I:** Morrison and Olsen High risk scoring inventory tool [18]: A modified version of Morrison and Olsen High risk scoring tool was used to assess women's pregnancy risk. It is a simplified, valid form for antenatal risk scoring shows that there are a number of cumulative risk factors in certain pregnancies influence the perinatal outcomes in a synergistic fashion and that these factors are more readily expresses and easily recognized in terms of numerical score. These risk scores with their designed numerical definitions categorize patient as low (0-2), high (3-6) or extreme high (7 or more) on the basis of past obstetric history, medical condition and events in the current pregnancy.

**Tool II:** An interview questionnaire sheet: was designed and developed by the researchers for data collection and it included: The socio-demographic characteristics of the study subjects such as age, employment status, family type, income, women's age at marriage and husband consanguinity; Bio-medical data including women's medical and surgical histories, both before and during their current pregnancies. Genetic data about women and their husbands' family histories of genetic diseases as hemophilia and Down's syndrome. Environmental / drug and medication exposure that gives detailed information about taken prescribed or non-prescribe drugs either before or during current pregnancy. Also it provides data about women's exposure to any type of radiation, smoking or other teratogens as pesticides. Past obstetrical history of infertility, number of gravidity, parity, previous abortion, number of living children and outcomes of previous pregnancies and deliveries and presence of gynecological problems and current pregnancy status including information about weeks of gestation, present complains and patterns of current antenatal initiation and regularity of follow up.

**Methods:** An official permission to carry out this study was obtained from the previously mentioned settings. Based on relevant literature, tool II was designed and developed by the researchers. A pilot study was done on 13 women scored as being with high risk pregnancy out

of 30 pregnant women attending the previously mentioned settings. Results of pilot study ascertained the relevance of the questions of tool II which reconstructed and made ready for use. Data were collected by the researchers from eligible Saudi women with high risk pregnancy, attending at the previously mentioned settings. Several Strategies were utilized to protect the subject's rights who agreed to participate in this study: Firstly verbal consent of the subjects of the study was obtained prior to the completion of the interview questionnaire sheet. Secondly subjects were informed of the purpose of the study, that the participation is voluntary and that they had the right to refuse to participate. Furthermore, the subjects of the study were told that they can refrain from answering any questions and they can terminate the interview at any time. Anonymity and confidentiality of the subjects were maintained at all times.

**Statistical Analysis:** The collected data was coded, entered and analyzed by using SPSS (Statistical Package for Social Science) statistical package version 16. Graphs were done using Excel program. Quantitative data was presented by mean (X) and standard deviation (SD). Qualitative data was presented as frequencies (Numbers and percent).

## RESULTS

Figure (1) shows that two hundreds out of 316 Saudi pregnant women were scored and diagnosed as having high risk pregnancy (HRP), constituting a prevalence of 63.3% which could be consider as a high prevalence. The results of the study reveal that 84% of Saudi women with high risk pregnancy aged between 30-35 old (44%) or between 35 - 40 yrs (40%) ( $\bar{X} \pm SD$  33.68 $\pm$ 4.7 years) (Table 1). Table1 also, shows that (20%) of them were working. About two-fifths (39%) of them aged less 20 years old at their first marriage ( $\bar{X} \pm SD$  20.6 $\pm$ 3.2 years - Range: 15 -31 years. 35% of them were reported husband consanguinity. It was observed that less than two-thirds of them (59.6%) were seen during their last trimester while more than one-third (37.4%) of them were in their second trimester, about one-third of them (33%) had regular antenatal visits (Mean number. of antenatal visits = 3.6  $\pm$  2.1), more than one half (54.5%) of women with regular antenatal visits initiated their visits during the second trimester of their current pregnancy and 41% of them initiated it during their 3<sup>rd</sup> trimester. Based on the anthropometric measurement of the studied

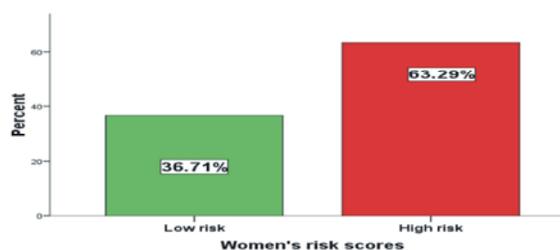


Fig. 1: Prevalence of high risk pregnancy among 316 studied pregnant women

Table 1: Socio-demographic characters, antenatal visits, BMI and weeks of gestation of 200 high risk pregnancy Saudi pregnant women, Taif, 2013-2014.

Characters	Frequency		Cumulative Percent
	N=200	Percent	
Age groups (Years): $\bar{X} \pm SD$ 33.6 $\pm$ 4.7 years			
<30 years	32	16	16
30 - 35 years	88	44	60
> 35- 40 years	80	40	100
Employment			
Working	40	20	20
Not working	160	80	100
Age of first marriage (Years): $\bar{X} \pm SD$ 20.6 $\pm$ 3.2 years (Range: 15 -31 years)			
<20 years	78	39	39
20 - 25 years	108	54	93
26- 31 years	14	7	100
Husband consanguinity (Yes)	70	35	35
Antenatal visits* (regular)	66	33	33
If regular, Initiation of antenatal visits:	3	4.5	4.5
(1st trimester)			
Second trimester	36	54.5	59
Third trimester	27	41	100
Weeks of gestation (1st trimester)	6	3	3
2nd trimester	74	37.4	40.4
3rd trimester	118	59.6	100
Body Mass Index Obese ( $\geq$ 30)	120	60	60
Daily activities (limited)	184	92	92
Total	200	100	

NB:\* Mean N0. of antenatal care = 3.6  $\pm$  2.1

Saudi women with high risk pregnancy, the calculated body mass index as shown by Table 1, it was found that three-fifths (60%) of them had obesity. The same table reveals that most of the studied pregnant women (92%) had no daily exercise except limited household activities.

Figure 2 illustrates that only 31.3% of the studied pregnant women experiencing normal current pregnancy while the rest of them complained of different medical associated conditions such as: anemia (25.3%), gestational diabetes (16.2%), pregnancy induced hypertension (15.2%), threaten abortion/ placenta previa (3%) and more than one associated conditions (9%). Table 2 shows the reproductive risk factors of the studied

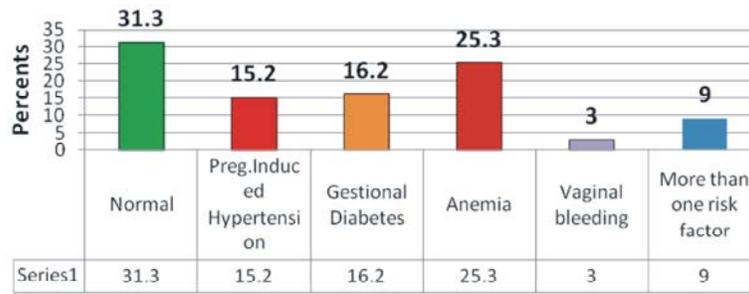


Fig. 2: Current pregnancy related complains among 200 pregnant Saudi High Risk Pregnancy Taif

Table 2: Reproductive risk factors of 200 studied pregnant women with high risk pregnancy Taif, 2013-2014.

Characters	Frequency n=200	Percent
History of infertility (yes)	34	17
No. of previous pregnancy (5- 12)	124	62
No. of previous deliveries (5-11)	94	47
No. of previous abortions (2 or more)	70	35
History of habitual abortion (Yes)	46	23
No. of living children (4-11)	116	58
Nature of previous pregnancy: (Normal)	68	34
Complicated:		
Pregnancy Induced hypertension	22	11
Gestational Diabetes	16	8
Anemia	32	16
Gynecological problems	26	13
More than one risk factor	36	18
Nature of previous delivery(C S)	53	26.5
Previous neonatal outcome (total =198)@		
Normal	136	68.7
Admission NICU	36	18.2
LBW	6	3
Neonatal death	6	3
More than one risk factor*	14	7.1
Total	200	100

@ Different from total sample due to missing values.

\* Hemolytic jaundice, premature infant,.. etc.

Table 3: Medical history of 200 Saudi women with High Risk Pregnancy and their family history, Taif, 2013-2014

Medical history	Frequency n=200	Percent
Past history of medical disease (Diabetes Mellitus)	42	21
Hypertension	38	19
Asthma	8	4
Heart disease	8	4
Thyroid dis.	4	2
More than one disease	32	16
Non	68	34
Family history of medical diseases:		
Diabetes Mellitus	26	13
Hypertension	14	7
Asthma	8	4
More than one disease	126	63
Non	26	13
Total	200	100

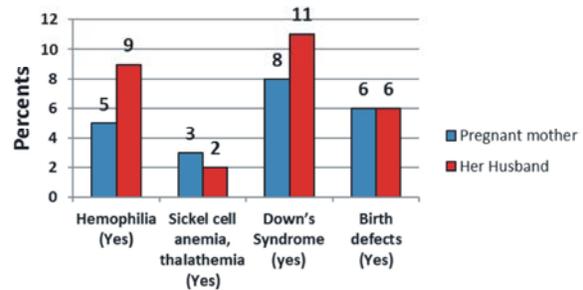


Fig. 3: Family history of genetic data of both HRP mother and her husband

Saudi women with high risk pregnancies, where 17% of them had history of infertility, 62% have 5-12 previous pregnancies and approximately half of them (47%) had between 5-11 previous deliveries and more than one-third (35%) of them had 2 or more previous abortion while 23% had history of habitual abortion. Also 58% of them had 4-11 living children. 34% of the studied Saudi women with high risk pregnancy had normal previous pregnancies About two-thirds (66%) of them had previous complicated pregnancies including anemia (16%), associated gynecological problems(13%), pregnancy induced hypertension (11%), gestational diabetes (8%) and 18% of them had more than one previously associated pregnancy medical conditions. More than one-quarter (26.5%) of the high risk pregnant women had previous cesarean section. 18.2% of them had history of neonatal admission to the neonatal intensive care unit and an equal proportion of them had previous low birth weight infants or neonatal deaths.

The medical history of the studied Saudi women with high risk pregnancy as shown by Table 3 reveals that 66% of them had history of medical disease such as diabetes mellitus (21%), hypertension (19%), bronchial asthma or heart disease (4%) and 16% of them had more than medical disease. Only 13% of them had no family history of medical disease while 87% of them had family history of more than one disease. Figure 3 indicates that

Table 4: Hazardous environmental / drug and medication exposure among 200 Saudi women with high risk pregnancy, Taif, 2013-2014

Hazardous Exposure	Frequency	
	n= 200	Percent
Exposure to radiation (Yes)	164	82
If yes which radiation type?(Ultrasound )	120	73.2
Exposure to smoking (Yes)	80	40
If yes: type of smoking: Passive	78	97.5
Exposure to pesticides (Yes)	44	22
Taking prescribed drugs during this pregnancy (Yes)	184	92
Taking non prescribed drugs during this pregnancy (Yes)	28	14
Total	200	100

a different proportion of the studied Saudi women with high risk pregnancy have family history of genetic such as down syndrome (8%), birth defects (6%), hemophilia (5%) and 3% of them had family history of sickle cell anemia and thalathemia. The figure also shows that husband of studied Saudi women with high risk pregnancy have family history of down syndrome (11%), hemophilia (9%) and birth defects (6%).

Table 4 shows Hazardous environmental / drug and medication exposure among the studied Saudi women with high risk pregnancy, it can be observed that more than four-fifths (82%) of them exposed to radiation during their current high risk pregnancies especially ultrasound radiation (73.2%). Two-fifths (40%) of them reported exposure to smoking (2.5% active and 97.5% passive smokers). Regarding exposure to pesticides, 22% of them reported exposure to pesticide during their current pregnancies. Most of them (92%) take their prescribed drugs during their current pregnancy while 8% of them were reluctant to take it. Also, 14% of them tend to take non prescribed drugs during their current high risk pregnancies.

## DISCUSSION

High risk pregnancy (HRP) is considered to be a major worldwide health problem running an increased risk of perinatal and maternal mortality [19]. In KSA, maternal mortality ratio shows no difference or decline between 2008 & 2010 (24/100000 live births) addressing significant problem toward improving maternal health [3]. High-risk pregnancy identification is a challenging work. This study determines the frequency of HRP among Saudi women in Taif city, Saudi Arabia. It also identifies and describes determinants and profile of HRP. In present study, the results revealed that 63.3% of the sample was at a high-risk, which could be considered as a high frequency. This result was similar to results obtained from a study in

Egypt Yassein *et al.* [20], where HRP were present in 63.8%. Also it was similar to other study done in Iran and reported a frequency of 63.5% HRP [21]. Both of the later studies used same tool as the current study [18]. However, it disagrees with a result by Janbi *et al.* [22] who reported a frequency of 106/229 (46.3%) in Al-Khobar city, Eastern, Saudi Arabia. This difference may be due to using different tools for measuring high risk pregnancy, our tool was brief, simple and easy to complete.

To identify the pregnancies at high risk, research into the risk factors for such tragedies remains a prerequisite for any selective strategy to prevent these deaths. In this study, about 60% of the high-risk pregnant women were in their third trimester followed by 37.4% in the second trimester and only 3% were in the first trimester. Only one third of them have regular antenatal care, the mean antenatal visits was  $3.6 \pm 2.1$  and they initiate it late, in the second (54.5%) and third (41%) trimesters of pregnancy. This is in keeping with the findings of previous studies among Saudi pregnant women in other district of Saudi Arabia as Buraida, Quasseim [23] and Riyadh [24].

Like other studies [15, 20], we encountered that the risk of HRP increased as maternal age increased. Forty percent of the Saudi pregnant women were at a high-risk because of their age of  $\geq 35$  years. It is generally assumed that women  $>35$  years have an increased risk for complications during pregnancy. However, most reported age-related risk factors are only indirectly related to age through their association with age-dependent confounders such as hypertension, diabetes, high parity, uterine myomas, pre-eclampsia and fetal chromosomal abnormalities. All of them being associated with a higher risk for emergency Cesarean Section. In turn; the later is associated with a higher risk for hemorrhage and infections complications [15]. More than one quarter (26.5%) of our HRP women had previous Cesarean Section. On the other hand, in our study, about 40% of HRP women were at high risk because of their age of first marriage of 15 - < 20 years. This result was consistent with that reported by Khoja and Farid [25] who showed that in Saudi Arabia average age at first pregnancy is 16 years. In addition, an increased prevalence of anemia, low-birth-weight (LBW) infants, pregnancy-induced hypertension (PIH) and cesarean section was found in young Saudi pregnant women [13]. In this study, the current associated medical conditions that considered as causes of HRP among Saudi women were: pregnancy induced hypertension with a frequency of 15.2% which was a higher frequency than other studies [1, 20, 26, 27]. The variations can be attributed to racial differences,

socioeconomic status and some other parameters like parity and age. In addition, it may be attributed to the late antenatal initiation and the high frequency of irregular antenatal visits in our study. Pregnancy induced hypertension increased the risk of subsequent type 2 diabetes mellitus by 3.41-fold [1]. Also we noticed a high frequency of gestational diabetes mellitus (GDM) as a cause of HRP in Taif (16.2%). This result was similar to a previous study in Riyadh which reported that mothers requiring insulin administration during current pregnancy were 15.5% of the total HRP [24]. However, this result disagrees with a study done in Riyadh too, by Al-Rowaily and Abolfotouh [10] who reported a prevalence of GDM of 12.5%. The higher frequency of GDM in our study may be due to the higher percentage (47%) of multiparous women (Para 5 - 9). Multiparous women were 8.29 times more likely to have GDM than nulliparous women. The high rate of GDM among grand multiparas may be due to the confounding effect of maternal age [1]. In addition, a high frequency of obesity as a cause of HRP in Taif (60%) with a limited physical activity was observed in our study. This result may be due to excessive gestational weight gain in Saudi Arabia which is emerging as an important predictor of maternal obstetric complications. Mothers who gain weight excessively during pregnancy are more likely to deliver by caesarean section, develop pre-eclampsia and become overweight or obese in later life [28]. Anemia was observed among 25.3% of HRP Saudi women in Taif. In addition, gynecological problems during the current pregnancy were a cause for HRP among 13.1% of women. Seventeen% of mothers in our series had been treated for infertility. Similar results were reported in Riyadh by Khashoggi [24].

The reproductive history determinants of HRP among Saudi women showed high frequencies in all its items. Multigravida (5-12) was 62%, multipara (5-11) was 47%, habitual abortion 23% and 58% had up to 4-11 children; this finding is inconsistent with other studies [29, 30]. Complicated previous pregnancy was observed among 66%, of which the highest frequencies were anemia constituted 16%, pregnancy induced hypertension constituted 11% and GDM 8%. Moreover, 26.5% of HRP women in Taif, had past surgical history of cesarean section (CS). This result showed a higher frequency of CS than that mentioned in Riyadh study (15.5%) [24]. Furthermore, 31.3% of HRP women had bad previous neonatal outcome (Admission to NICU, LBW and neonatal death). Regarding medical history of the studied Saudi women with HRP revealed that 66% of them had

history of medical disease such as diabetes mellitus (21%), hypertension (19%), bronchial asthma or heart disease (4%), and 16% of them had more than one medical disease. Similar findings were reported by PRUAL *et al.* [31]. Also 13% of them had family history of diabetes mellitus, 7% of hypertension, 8% Down's syndrome, 6% birth defect and 5% hemophilia. Whereas a higher frequencies were observed among husbands of HRP women with family history of Down's syndrome 11%, birth defect 6% and hemophilia 9%. This result may be due to the higher frequency (35%) of husband consanguinity in our study [32].

One of the characteristics of this study was the investigation of the exposure of HRP Saudi women to hazardous teratogenic environmental risk factors and drugs. Unfortunately, more than four fifth (82%) of them exposed to radiation during their current HRP especially ultrasound radiation (73.2%). It is worth noting that 40% of them exposed to smoking, out of the later 97.5% were passive smoking. This result similar to a recent study in Jeddah [33], about one fifth of HRP women exposed to pesticides and 14% of them tend to take non prescribed drugs during their current HRP. The higher frequencies of all these findings may be due to the fact that the majority of the women with high risk pregnancies sought antenatal care late, in the second (54.5%) and third (41%) trimesters of pregnancy. These factors underlie the need to develop and implement effective community-driven educational programs under the umbrella of antenatal care to minimize the exposure of pregnant women to all hazardous teratogenic environmental risk factors and drugs.

The present study has some limitations. One is that, although our study was descriptive cross section study, the low risk pregnancy group was not included, so no control group was assigned so results cannot be compared. Another is that our "gold standard" was self report of different types of risk factors rather than either biologic measures or records examinations. Other is some of the important information regarding past gynecological history of lower abdominal pain and chronic vaginal discharge, which are usual presentations of pelvic inflammatory disease, use and frequency of vaginal douches, detailed history of contraceptive methods used, were missing.

According to this study results, we recommended proper screening techniques to be used for all pregnant women attending antenatal clinics to pick up the factors that qualify the pregnant women for a risky pregnancy. In addition, all primary health care team members providing antenatal care services in Taif, should receive

continuous medical education and in-service training about screening and identifying of high risk pregnancy. Moreover, Health education sessions should be conducted for all females, especially pregnant women, about the hazards associated with maternal age, high parity, high gravida, habitual abortions, hypertension, diabetes mellitus, ect. Also, studies to explore the reasons for late initiation of antenatal care among Saudi pregnant women in Taif are needed.

In conclusion, the findings of this study represent the first report from Taif, Saudi Arabia of the prevalence of HRP among Saudi pregnant mothers(63.3%) and the identification of putative risk factors such as older maternal age 30-40 years(84%), obesity(60%), multigravida 5-12 (62%), multipara 5-11 (47%), habitual abortion (23%) and 68.7% of them complained of different medical associated conditions during their current pregnancies such as: anemia (25.3%), gestational diabetes (16.2%), pregnancy induced hypertension (15.2%). 40% of them reported exposure to smoking (2.5% active and 97.5% passive smokers). Consequently, in the future, the implantation of routine screening for HRP during the antenatal visits to primary health care centers in Saudi Arabia must be addressed.

#### REFERENCES

1. Lykke, J.A., J.L. Roos and B.M. Sibail, 2009. Hypertensive Pregnancy Disorders and Subsequent Cardiovascular Morbidity and Type 2 Diabetes Mellitus in the Mother. *Hypertension*, 53: 944-951.
2. Waterston, M., S. Bewley and C. Wolfe, 2001. Incidence and predictors of sever obstetric morbidity: case control study. *BMJ*, 322: 1089-93.
3. Unicef, 2012. Country profile, Saudi Arabia. Maternal, newborn and child survival. Statistics and Monitoring Section/Policy and Practice.
4. Czeresnia, J.M., E.A. Júnior and E. Cordioli, 2013. Applicability of the Rapid Biophysical Profile in Antepartum Fetal Well-Being Assessment in High-Risk Pregnancies from a University Hospital in São Paulo, Brazil: Preliminary Results. Hindawi Publishing Corporation. *ISRN Obstetrics and Gynecology*, Article ID 329542, pp 4 pages <http://dx.doi.org/10.1155/2013/329542>.
5. Chaman, R.M., M. Yunesian, B. Golestan and K.H. Naini, 2007. Effect of high-risk pregnancies on infant mortality using a case -control method in a sample from rural population. *Iranian Journal of Epidemiology*, 4: 1-6.
6. Omu, A.E., S. Al-Othman and F. Al-Qattan, 1996. comparative study of obstetric outcome of patients with pregnancy induced hypertension: economic considerations. *Acta Obstet Gynecol Scand*, 75: 443-8.
7. Pietrantonio, M. and W.F. O'Brien, 1994. The current impact of hypertensive disorders of pregnancy. *Clin Exp Hypertens*, 16: 479-92.
8. Rosas, M., C. Lomeli and G.C. Mendoza, 2008. Hypertension and pregnancy. *Arch Cardiol Mex*, 2: S2-104-108.
9. Samadi, A.R., R.M. Mayberry and A.A. Zaidi, 1996. Maternal hypertension and associated pregnancy complications among African-American and other women in the United States. *Obstet Gynecol*, 87: 557-63.
10. Al-Rowaily, M.A. and M.A. Abolfotouh, 2010. Predictors of gestational diabetes mellitus in a high-parity community in Saudi Arabia. *East Mediterr Health J*, 6: 636-41.
11. Satpathy, H.K., A. Fleming and D. Frey, 2008. Maternal obesity and pregnancy. *Postgrad Med*, 3:E01-9. doi: 10.3810/pgm.2008.09.1920.
12. Mahfouz, A.R., M.M. El-Said, R. Al-Erian and A.M. Hamid, 1995. Teenage pregnancy: are teenagers a high risk group? *Eur J. Obstet Gynecol Repr Biol.*, 59: 17-20.
13. Heija, A., A.M. Ali and S. Al-Dakheil, 2002. Obstetrics and perinatal outcome of adolescent nulliparous pregnant women. *Gynecol Obstet Invest*, 2: 90-92.
14. Mesleh, R.A., A.S. Al-Aql and A.M. Kurdi, 2001. Teenage pregnancy. *Saudi Med J*, 22: 10.
15. Katwijk, C.V. and L.H. PeetersL, 1998. Clinical aspects of pregnancy after the age of 35 years: a review of the literature. *Human Reproduction Update*, 4: 185-194.
16. Lee, W., C.M. O'Connell and T.F. Basket, 2004. Maternal and Perinatal outcomes of Eclampsia: Nova Scotia, 1981-2000. *J Obstet Gynecol Can*, 2: 119-23.
17. Dadelszen, P.V. and L. Magee, 2008. What matters in preeclampsia are the associated adverse outcomes: the view from Canada. *Current Opinion in Obstetrics and Gynecology*, 20: 110-15.
18. Morrison, L. and J. Olsen, 1979. Perinatal Mortality and Antepartum Risk Scoring. *Obstetrics & Gynecology*, 3: 362-366.
19. Nisell, H., K. Palm and K. Wolff, 2000. Prediction of maternal and fetal complications in preeclampsia. *Acta Obstet Gynecol Scand*, 79: 19-23.

20. Yassein, S.A., A. El-Deen, M.A. Emam and A.K. Omer, 2005. The profile of high-risk pregnancy in El-Mansoura city. *J. Egypt public Health Assoc*, 80: 687-706.
21. Kashani, E., H. Amin and M.A. Ameri, 2012. The Rate Of The Prevalence Of High-Risk Pregnancies And The Results On Pregnant Mothers And The Effect On Parameters After The Birth. *Advances in Environmental Biology*, 3: 1319-1324.
22. Janbi, S.O., A.A. Sabra, A.M. Sebiyani and A.S. Hafez, 2013. Predictors of Maternal Weight Gain during Normal and High Risk Pregnancies: a Retrospective Study in Primary Care, Eastern Saudi Arabia. *The Canadian Journal of Clinical Nutrition*, 1: 5- 15.
23. Nisa, M.U., M. Aslam, S.R. Ahmed, M. Rajab and L. Kattea, 2009. Impact of Obesity on Fetomaternal Outcome in Pregnant Saudi Females. *Int J. Health Sci. (Qassim)*, 2: 187-195.
24. Khashoggi, T.Y., 2005. Epidemiology of intrauterine fetal deaths in Saudi Arabia: kkuh experi-ence. *Biomedical Research*, 1: 59-64.
25. Khoja, A.T. and A.M. Farid., 2000. Saudi Arabia Family Health Survey, Ministry of Health, Saudi Arabia.
26. Al-Ghamdi, S.M., Frcpc., Facp and S. Ali, 1999. Hypertensive disorders of pregnancy: prevalence, classification and adverse outcomes in northwestern Saudi Arabia. *Annals of Saudi Medicine*, pp: 19.
27. Hussein, M.M., M.V. Jacob, Mooij and R. Haysam, 1999. Hypertension in Pregnancy: Presentation, Management and Outcome – A Retrospective Analysis of 135 Cases. *Saudi J. Kidney Dis. Transplant*, 4: 416-424.
28. Stuebe, A.M., E. Oken and M.W. Gillman., 2009. Associations of diet and physical activity during pregnancy with risk for excessive gestational weight gain. *Am J. Obstet Gynecol.*, 1: 58-61.
29. Cedergren, M., 2006. Effects of gestational weight gain and body mass index on obstetric outcome in Sweden. *Int. J. Gynaecol Obstet*, 3: 269-274.
30. Chin J. and M. Murtaugh, 2012. Socio-demographic and behavioral predictors of gestational weight gain. *Am J Obstet Gynecol*, 206: S255-S256.
31. PRUAL, A., T. Dhuguet and Y. Laurent, 2000. The quality of risk factor screening during antenatal consultations in Niger. *Health Policy and Planning*, 1: 11-16.
32. Tadmouri, G.O., P. Nair, T. Obeid and M.T. Al Ali, 2009. Consanguinity and reproductive health among Arabs. *Reproductive Health*, 17 doi:10.1186/1742-4755-6-17.<http://www.reproductive-health-journal.com/content/6/1/17>.
33. Wali, S.O., 2011. Smoking habits among medical students in Western Saudi Arabia. *Saudi Med J.*, 8: 843-8.