Schizophrenia and Its Association with Biological and Environmental Factors: A Community Based Study

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Authors' Contributions

The work was carried out in collaboration between all authors. Author AB designed the study performed and supervised the study. Author AB was supervising the data collection, data analysis and writing of the paper. Author EED was also involved in data collection, interpretation of data and writing manuscript. All authors approved the final version.

ABSTRACT

Aims: The aim of this study was to examine the proportion of probable schizophrenia in Arab population visiting primary health care centers and investigate its associated biologic and environmental factors.
Study Design: Cross sectional study.
Place and Duration of Study: Primary Health Care (PHC) centres, Supreme Council of Health, Qatar, between January 2009 to December 2010.
Subjects: Of 1491 Arab patients approached, 1148 patients agreed to participate in the study (77%).
Methods: The study was based on a face to face interview with a designed questionnaire including socio-demographic, biologic and environmental factors. A diagnostic screening questionnaire which consisted of 6 questions about the symptoms of schizophrenic disorders was used for the diagnosis of schizophrenia.
Results: Of the studied subjects, 11.7% of them were diagnosed with schizophrenia. A significant association was observed between schizophrenic and non-schizophrenic

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patients in terms of age group (p=0.048), BMI (p=0.019), gender (p=0.027), ethnicity (p=0.008), marital status (p=0.001), occupation (p<0.001), household income (p<0.001) and place of residence (p=0.039). Obstetric complications were significantly higher in schizophrenic patients with a higher frequency of pregnancy stress (31.3%; p<0.001) and diabetes (20.1%; p=0.008). Among the obstetric complications, Rhesus incompatibility (OR 2.74; 95% CI (1.16-6.47); P=0.021) and pregnancy stress (OR 2.51; 95% CI (1.60-3.94); P<0.001) were the major predictors for the development of schizophrenia. Delivery complications of asphyxia (17.9%; p=0.003), uterine atony (10.4%; p=0.028) and emergency caesarean section (17.2%; p=0.024) were significantly higher in mothers of the patients. Urban upbringing (OR 1.60; 95% CI (1.02 - 2.50); P<0.037) and social isolation (OR 1.72; 95% CI (1.06-2.74); P<0.027) were the main significant environmental risk factors for schizophrenia.
Conclusion: An increasing schizophrenia risk with obstetric complications was observed in the study sample. Rhesus incompatibility and pregnancy stress were the main predictors for schizophrenia.

1. INTRODUCTION

Schizophrenia is a serious mental illness that causes major disability and psychosocial impairment. Schizophrenia is one of the most severe mental disorders occurring in all population [1]. Schizophrenia has been described in all cultures and socio-economic groups throughout the world [2]. Schizophrenia affects about 24 million people worldwide which is 1 in 100 people worldwide. Schizophrenia is a leading cause of disability, not only in the U.S, but in other developed countries around the world. The World Health Organization (WHO) listed schizophrenia as the world's ninth leading cause of disability [3]. Schizophrenia has been recognized as a major public health problem evidenced by its ranking of fourth position among the global burden of diseases [4,5]. It was estimated that it will occupy the second position by the year 2020. Schizophrenia is disproportionately costly to society for reasons that go beyond the number of people affected by the disorder. The World Health Organization estimates the direct health care costs of schizophrenia in Western countries range between 1.6% and 2.6% of the total health care expenditures [6]. New York High Risk project [7] found 10 to 15 fold increased risk in offspring of patients with schizophrenia, compared to the general population.

Environmental factors are among the etiological factors involved in the appearance of schizophrenia. Although genetic factors may be more strongly associated with the development of schizophrenia, other more commonly occurring factors for example obstetric, birth and other environmental factors may exert greater effect in terms of population attributable risk [8]. It was revealed that even the presence of genetic predisposition for schizophrenia, people tend to have adequate mental health throughout their life and manifest schizophrenia symptoms only when they come in contact with stressful environmental factors responsible for precipitating Sz. [9]. Over the past 5 decades, many studies have been performed in order to identify the non-genetic factors that would increase the risk of schizophrenia. Etiological factors of schizophrenia could be divided into three groups of complications [10] pregnancy complications including bleeding, diabetes, Rhincompatibility and pre-eclampsia, abnormal fetal growth and development such as low birth weight, congenital malformations and small head circumference and delivery

complications including uterine atony, asphyxia and emergency caesarean section. Previous studies of Bener et al in Qatar reported a high risk pregnancy with maternal complications among women and they were major contributors to neonatal complications [11,12]. Also, it was documented that one quarter of all adult women in developed countires suffer from short or long term illness related to pregnancy and childbirth [13]. Other reported potential environmental risk factors are non-specific stress, mental and physical abuse, drug use, living in urban setting, migration and trauma in childhood. Early detection and intervention for schizophrenia is of increasing interest in recent years [14,15].

The state of Qatar is a small country located in the Arabian Peninsula. Qatar is a rapidly developing country with a change that influenced the lifestyle of the people towards urbanization, particularly over the recent decades. Thirty percent of the total populations of Qatar are nationals and a good proportion of expatriates residing in Qatar are from Arab countries. The population of State of Qatar was approximately 1.9 million with 60% of Arab nationalities and 40% non Arabs. The nationals constitute 30%. Since Arab countries share great deal in terms of culture and life style, this study focused on the Arab population residing in Qatar. There are 22 primary health care centers strategically located throughout Qatar with a referral system to hospitals. There are 8 government hospitals under the umbrella of the Hamad Medical Corporation which provides comprehensive secondary and tertiary care. Add to this, there are 5 hospitals and 239 individual clinics and polyclinics in the private sector to support the health care system of Qatar. Whole populations in Qatar have access to health care. Despite a definite genetic component to schizophrenia, this study has identified several non-genetic risk factors. Understanding the prevalence of schizophrenia has important implications for both health service planning and risk factor epidemiology. Schizophrenia is a serious illness that results in considerable burden to sufferers, carers, and society.

Over the past few years, there have been encouraging advances identifying the risk factors in schizophrenia. The study examined the proportion of possible or probable schizophrenia among 1148 Arab population who attended the primary health care clinics for a variety of reasons. To the best of our knowledge, this may be the first study reporting the prevalence of schizophrenia and examines the biologic and environmental factors associated with schizophrenia.

2. MATERIALS AND METHODS

This prospective cross sectional study was conducted in the State of Qatar from January 2009 to December 2010 to determine the prevalence and identify the non-genetic risk factors associated with the development of schizophrenia. The study included Arab patients aged 18 to 55 years who attended Primary Health Care (PHC) centres throughout Qatar. PHC centres are frequented by all levels of the general population as a gateway to specialist care. The study was conducted among patients, who were visiting 13 health centres; 10 centres from urban area and 3 centres from semi-urban area as a representative sample of the community. These 13 health centers represented proportionally the Arab population geographically. Patients visiting health centers receive primary health care services, both preventive and curative and these health centers are run by family physicians and qualified GPs with long experience in the primary care. Those who need specialized care will be referred to Outpatient clinics of the hospitals. Individuals with mental health problems are attended by the outpatient department of the Psychiatry department. Expatriates who have families in Qatar are registered in health centers and there is one health center exclusively

for bachelors. Hence women are more likely to visits these health centers than men. We have used an estimate of 10% for prevalence of schizophrenia as reported in a previous study of Bener et al. (in press) and for computing 99% confidence limits with 2% error bound, giving a sample size estimate of 1491 subjects. The authors have obtained ethical approval from the Medical Research Committee, Hamad Medical Corporation to conduct research in Qatar.

A multistage stratified sampling design was performed and subjects selected by simple random sampling. A total of 1491 Arab patients were approached and 1148 patients agreed to participate in the study with a response rate of 77%. Patients have given their verbal informed consent before interviewing them. Of the approached subjects, 23% of them were excluded from the study because some of them refused to take part and rest of them were incomplete questionnaires.

The data were collected through a validated questionnaire based on face-to-face interviews by physicians and qualified nurses using the local language. The nurses were aware of the Arabic culture and were able to convince the study participants if they were not open to discuss their problems and answer the questions. The questionnaire had four parts. The first part included the socio-demographic details of the patients, the second part covered biological factors with maternal and birth complications and third part included other environmental factors and fourth was the diagnostic screening questionnaire for schizophrenia. Maternal and birth complications were collected from their medical records. All infants born in Qatar and outside of Qatar have complete records in their files. For those who are born outside Qatar, their maternal and birth complications will be recorded once they come back to "Well baby" clinics for immunization. The variables mentioned in the questionnaire were available in their medical files and incase of missing information, they were contacted personally and completed the questionnaire. The diagnostic screening questionnaire adopted the questions about symptoms of Schizophrenia from the World Health Organization instrument such as "hear voices when you are alone", "feel that you are being followed", "feel you are spied on", "find a strange talking about you", "others control your actions, thoughts, feelings and understand your thoughts". Psychiatrists confirmed the diagnoses of schizophrenia using DSM-IV criteria. This diagnostic screening questionnaire identified 134 subjects diagnosed with schizophrenia. Patients were asked to answer the questions by grading them from 0 to 4; with 0 for "not at all", 1 for "a little", 2 for "moderately", 3 for "quite a bit" and 4 for "extremely". The survey instrument was tested on 100 patients who visited the health centres and thus validated the questionnaire. Content validity, face validity and reliability of the questionnaire were tested using 100 subjects. These tests demonstrated a high level of validity and high degree of repeatability (kappa = 0.85).

Student-t test was used to ascertain the significance of differences between mean values of two continuous variables and confirmed by non-parametric Mann-Whitney test. Chi-square and Fisher's exact test were performed to test for differences in proportions of categorical variables between two or more groups. Multivariate logistic regression analysis using the forward inclusion and backward deletion method to assess the relationship between dependent and independent variables and to adjust for potential confounders and orders the importance of risk factors (determinant) for the schizophrenia. P value <0.05 was considered statistically significant.

3. RESULTS AND DISCUSSION

3.1 Results

3.1.1 Socio-demographic characteristics

The socio-demographics characteristics of the studied subjects with and without schizophrenia are summarized in Table 1.

Of the studied subjects, 50.3% were males and 50.1% were Qataris. The prevalence of schizophrenia in the study sample was 11.7%, with a male to female ratio 1:1.4. Most of the schizophrenic patients were in the age group 40 – 55 years (55.2%) and married (86.6%). 29.9% of the schizophrenic patients were obese. Schizophrenia was significantly more frequent in subjects above 40 years old (55.2%; P=0.048), women (59%; P=0.03), married (86.6%; P=0.001). Family history of schizophrenia was significantly higher in schizophrenic subjects as compared to their counterparts (19.5% vs 8.1%; p<0.001).

Table 1. Socio-demographic characteristics of the studied subjects with or without schizophrenia (N=1148)

Variable	Total N=1148 n(%)	Subjects		*P*-value
		With schizophrenia N=134 n (%)	Without schizophrenia N=1014 n (%)	
Age(Mean±SD)	38.9±13.4	40.7±12.2	38.7±13.4	0.099
Age in Years				
<30 Years	354(30.8)	32(23.9)	322(31.8)	0.048
31-39 Years	272(23.7)	28(20.9)	244(24.1)	
>40 Years	522(45.5)	74(55.2)	448(44.2)	
BMI Group				
Normal (<25 kg/m2)	489(42.6)	72(53.7)	417(41.1)	0.019
Overweight (26-39)	254(22.1)	22(16.4)	232(22.9)	
Obese (30+)	405(35.3)	40(29.9)	365(36.0)	
Gender				
Male	578(50.3)	55(41.0)	523(51.6)	0.027
Female	570(49.7)	79(59.0)	491(48.4)	
Nationality				
Qatari	575(50.1)	82(61.2)	493(48.6)	0.008
Other Arab Nationality	573(49.9)	52(38.8)	521(51.4)	
Martial Status				
Single	287(25.0)	18(13.4)	269(26.5)	0.001
Married	861(75.0)	116(86.6)	745(73.5)	
Education Level				
Illiterate	113(9.8)	19(14.2)	94(9.3)	
Primary	168(14.6)	18(13.4)	150(14.8)	0.204
Intermediate	193(16.8)	19(14.2)	174(17.2)	
Secondary	414(36.1)	54(40.3)	360(35.5)	
University	260(22.6)	24(17.9)	236(23.3)	
Occupation				
Not Working	458(39.9)	39(29.1)	419(41.3)	<0.001
Sedentary/Professional	402(35.0)	48(35.8)	354(34.9)	
Manual	133(11.6)	11(8.2)	122(12.0)	
Business man	97(8.4)	24(17.9)	73(7.2)	

Army/police	58(5.1)	12(9.0)	46(4.5)	
Household income/month* QR				
<10,000	225(19.6)	15(11.2)	210(20.7)	
10,000-19,999	685(59.7)	60(44.8)	625(61.6)	<0.001
>20,000	238(20.7)	59(44.0)	179(17.7)	
Place of Residence				
Urban	915(79.7)	116(86.6)	799(78.8)	0.039
Semi Urban	233(20.3)	18(13.4)	215(21.2)	
Family history*	108(9.4)	26(19.5)	82(8.1)	<0.001

family history of schizophrenia (either mother/father or both)

3.1.2 Obstetric and birth complications

Table 2 identifies the obstetric and birth complications reported in mothers of the studied subjects with and without schizophrenia. Most of the obstetric complications were significantly higher in schizophrenic patients; stress during pregnancy (31.3% vs 13.8%; $P<0.001$); diabetes (20.1% vs 11.5%; $P=0.008$), bleeding (12.7% vs 6.9%; $P=0.023$), rhesus incompatibility (12.7% vs 5.6%; $P=0.004$) and Preeclampsia (9.7% vs 5.2%; $P=0.047$). Even for birth complications, emergency caesarean section (17.2% vs 10.4%; $P=0.024$), asphyxia (17.9% vs 9.0%; $P=0.003$), uterine atony (10.4% vs 5.2%; $P=0.028$), premature birth (10.4% vs 5.1%; $P=0.027$) and small head circumference (18.7% vs 11.3%; $P=0.024$) were significantly higher in schizophrenic patients.

Table 2. Obstetric and birth complications reported in mothers of the studied subjects with and without schizophrenia (N=1148)

Variable	Subjects		*P*-value
	Schizophrenia N=134 n (%)	Without Schizophrenia N=1014 n (%)	
Obstetric complications			
Bleeding			
Yes	17(12.7)	70(6.9)	0.023
No	117(87.3)	944(93.1)	
Abnormal fetal growth			
Yes	7(5.2)	32(3.2)	0.206
No	127(94.8)	982(96.8)	
Rhesus incompatibility			
Yes	17(12.7)	57(5.6)	0.004
No	117(87.3)	957(94.4)	
Congenital malformation			
Yes	9(6.7)	30(3.0)	0.038
No	125(93.3)	984(97.0)	
Diabetes			
Yes	27(20.1)	117(11.5)	0.008
No	107(79.9)	897(88.5)	
Viral infection			
Yes	14(10.4)	76(7.5)	0.232
No	120(89.6)	938(92.5)	
Preeclampsia			
Yes	13(9.7)	53(5.2)	0.047
No	121(90.3)	961(94.8)	

Stress during pregnancy			
Yes	42(31.3)	140(13.8)	<0.001
No	92(68.7)	874(86.2)	
Birth complications			
Asphyxia			
Yes	24(17.9)	91(9.0)	0.003
No	110(82.1)	923(91.0)	
Uterine Atony			
Yes	14(10.4)	53(5.2)	0.028
No	120(89.6)	961(94.8)	
Umbilical cord around the neck			
Yes	24(17.9)	134(13.2)	0.143
No	110(82.1)	880(86.8)	
Premature birth			
Yes	14(10.4)	52(5.1)	0.027
No	120(89.6)	962(94.9)	
Small head circumstances			
Yes	25(18.7)	115(11.3)	0.024
No	109(81.3)	899(88.7)	
Emergency cesarean section			
Yes	23(17.2)	105(10.4)	0.024
No	111(82.8)	909(89.6)	

3.1.3 Other environmental factors

Other environmental factors of the studied subjects with and without schizophrenia are shown in Table 3. Environmental factors such as urban upbringing (83.6% vs 50.7%; p<0.001), trauma in childhood (25.4% vs 17.7%; p=0.034) and social isolation (23.9% vs 15.2%; p=0.013) were significantly more frequent among schizophrenic probands, compared to non-schizophrenic subjects.

Table 3. Other environmental factors of the studied subjects with and without schizophrenia (N=1148)

Variable	Subjects		*P-value*
	With schizophrenia N=134, n (%)	**Without schizophrenia N=1014, n (%)**	
Urban Upbringing			
Yes	112(83.6)	514(50.7)	<0.001
No	22(16.4)	500(49.3)	
Exposure to house cat			
Yes	27(20.1)	171(16.9)	0.333
No	107(79.9)	843(83.1)	
Exposure to farm animals			
Yes	25(18.7)	132(13.0)	0.082
No	109(81.3)	882(87.0)	
Child Physical abuse			
Yes	12(9.0)	44(4.3)	0.030
No	122(91.0)	970(95.7)	
Trauma in childhood			
Yes	34(25.4)	179(17.7)	0.034

No	100(74.6)	835(82.3)	
Disrupted relationship			
Yes	15(11.2)	56(5.5)	0.020
No	119(88.8)	958(94.5)	
Use of different drugs			
Yes	12(9.0)	84(8.3)	0.740
No	122(91.0)	930(91.7)	
Social isolation			
Yes	32(23.9)	154(15.2)	0.013
No	102(76.1)	860(84.8)	
Early parent loss/separation			
Yes	12(9.0)	52(5.1)	0.073
No	122(91.0)	962(94.9)	
Use of excessive smoking			
Yes	13(9.7)	59(5.8)	0.088
No	121(90.3)	955(94.2)	

3.1.4 Predictors for the schizophrenia

Table 4 shows the predictors for the schizophrenia in patients using multivariate logistic regression. Rhesus incompatibility (OR 2.74; 95% CI (1.16-6.47); P=0.021); stress during pregnancy (OR 2.5; 95% CI (1.6 – 3.94); p<0.001), social isolation (OR 1.72; 95% CI (1.06-2.74); P=0.027); family history (OR 1.73; 95% CI (1.36 – 2.2); p<0.001), urban upbringing (OR 1.6; 95% CI (1.02-2.5); P=0.037); obesity (OR 1.28; 95% CI (1.02-1.61); p=0.031) were considered as the main significant factors associated with schizophrenia.

**Table 4. Predictors for the schizophrenia in patients using
multivariate logistic regression (N=1148)**

Independent variable	Odds ratio	95% confidence interval	*P-value*
Rhesus incompatibility	2.74	1.16-6.47	0.021
Stress during pregnancy	2.51	1.60-3.94	<0.001
Premature birth	1.93	1.11-3.71	0.046
Family history*	1.73	1.36-2.20	<0.001
Urban upbringing	1.60	1.02-2.50	0.037
Low socio-economics	1.44	1.18-1.93	0.012

*family history of schizophrenia (either mother/father or both)

3.2 Discussion

Schizophrenia is one of the most important public health problems that human society confronts. It has been generally accepted that schizophrenia, like all other complex disease, is caused by genetic and environmental factors. A previous study on the impact of consanguinity on risk of Schizophrenia reported the association of consanguinity and Sz in the Arab population of Qatar [16]. This is the first study that estimated the burden of disease due to schizophrenia in Qatar and determined the influence of epidemiological factors on the burden of disease from schizophrenia. This epidemiologic study of schizophrenia may shed a new light on our understanding of the biologic and environmental factors that have been associated with increased risk of schizophrenia among offspring. The present study identified a high prevalence of schizophrenia in Arab population residing in Qatar (11.7%)

which is similar to the rate observed in our previous study (10.6%) [17]. It is difficult to compare our prevalence estimate with other studies due to the difference in methodology, defined population and cut off value of the diagnostic screening instrument for the diagnosis of schizophrenia. However, the prevalence of schizophrenia in our study sample falls in the range reported by other studies; 5% to 20% [18,19,20].

An interesting question found in the literature is whether there is a sex difference in the risk of schizophrenia. In the study sample, a gender difference was observed with male to female ratio 1:1.4. It was found that women at greater risk of schizophrenia than men. On the contrary, male being at higher risk than females in the U.S, Canada and Western Europe with the sex ratio 1.2:1 [21]. Also, [22] reported a similar ratio of 1.4:1 in their study. It is well established that men and women differ in terms of the onset, manifestation, and longitudinal course of schizophrenia [9] Studies from many countries [23,24] reported that females with schizophrenia tend to manifest the disorder at older age than males. Even in the study sample, schizophrenia was more frequent among females in the age group above 40 years. Also, it appeared that females have more familial form of the illness than males. These are the factors which might have caused the high prevalence of schizophrenia among females in the study cohort. The present study challenges the widely held view that schizophrenia is much more common in men. Because of the gender difference in the schizophrenia research, it was recommended [25] that we must develop and provide not only culturally appropriate services, but also services that are gender sensitive, as the number of cases in women are higher than expected.

Numerous epidemiological studies found an increased risk of schizophrenia among persons exposed to obstetric and birth complications especially maternal exposure to a major stressor during pregnancy [20,26]. Even the current study observed significantly a higher incidence of obstetric complications among mothers of the schizophrenic patients, compared to non-schizophrenic subjects such as pregnancy stress (31.3%; $P<0.001$), diabetes (20.1%; $P=0.008$), bleeding (12.7%; $P=0.023$), rhesus incompatibility (12.7%; $P=0.004$), and preeclampsia (9.7%; $P=0.05$). Also, our study found that rhesus incompatibility and stress during pregnancy were the major contributors for schizophrenia with the odd ratio of 2.74 and 2.51 respectively compared to the risk found in normal population. It is important to note that the studied Arab women had maternal exposure to adverse life events in their pregnancy. Khashan et al. documented that maternal stressors during pregnancy like exposure to war, unwanted pregnancy and a death of a loved one have been associated with increased risk of schizophrenia in offspring [27]. Another important result in the study sample is the significant association between gestational diabetes and later schizophrenia (20.1%; $p=0.008$) which is similar to another study of Schafer et al. [28]. Among the environmental contributors, obstetric complications have consistently been associated with schizophrenia which is similar to the results of another study by Cannon et al. [26]. These study findings reveal that association between obstetric complications and schizophrenia has provided crucial support for developmental, biologic and environmental etiological models of the disorder.

Complications of delivery, rather than of pregnancy, are more likely to occur with increased frequency in schizophrenia sample. The common mechanism for the delivery complications of asphyxia (17.9%; $P=0.003$), emergency caesarean section (17.2%; $P=0.024$) and uterine atony (10.4%; $P=0.028$) were found significantly higher in mothers of the schizophrenic patients. It was documented [29] that complications of pregnancy and delivery are among the most extensively studied of putative early risk factors for schizophrenia. Similar to our results, the suggested obstetric and birth risk factors in another study [30] were

preeclampsia, small head circumference, low birth weight, Rh incompatibility and fetal distress.

Among the other environmental factors, urban upbringing (83.6%; *P*<0.001), childhood trauma (25.4%; *P*=0.034) and social isolation (23.9%; *P*=0.013) were more common in our schizophrenic study sample with a significant difference with non-schizophrenic subjects. In terms of urbanization, it has been found that the incidence of schizophrenia was higher in patients from urbanized area (83.6%; *P*<0.001), as compared to rural areas. Geographically, there is no rural areas in Qatar and Qatar is divided by urban and semi urban. Thus, the high prevalence of schizophrenia observed in the study sample could be due to the fact that majority of the study subjects had an urban upbringing which is an associated factor for the high risk of schizophrenia. Also, urban upbringing had an odd ratio of 1.6 for schizophrenia, compared to subjects in rural areas. A Danish study [18] found that individuals living their first 15 years in the most highly urbanized environment had a relative risk of 2.75 for schizophrenia which is higher than the risk rate found in the study sample. These study findings reveal that urban upbringing increases the risk for schizophrenia and indicate that exposure occurring more frequently in urban settings are responsible for the association.

Also, Social isolation (23.9%; p=0.013) was found an important significant environmental factor in our schizophrenic patients which is similar to another study that social isolation and discrimination of the neighbourhood environment in urban areas have been associated with the elevated risk of schizophrenia [31]. This is evident in our data that a good proportion of the schizophrenic patients were Arab expatriates (38.8%) and mostly from urban areas. Another notable environmental risk factor was childhood trauma that increased risk of schizophrenia (25.4%; p=0.034) which is similar to the results of another study [32].

This study confirmed that although genetic factors play a substantial role in the etiology of the disorder, biologic and environmental risk factors have an important role in the development of schizophrenia. Among the environmental factors, obstetric complications were related to the subsequent development of schizophrenia which needs to be identified. Also, population demographic indicates increasing urbanization in both the developed and developing countries which would be a concern for the incidence of schizophrenia.

The limitations of the study are important to be noted. The study covered 70% of the total visits to Primary Health Care Centres in Qatar. The study sample is from the Arab populations which include Qataris and non-Qatari Arabs residing in Qatar. Non-Qatari Arabs include various nationalities like Palestinians, Jordanians, Egyptians, Syrians, Lebanese, Sudanese and people from other gulf countries. Thus, they can be considered as heterogeneous group with slight difference in their rate of consanguineous marriages. Since it is a cross sectional study, we might not have targeted the appropriate study subjects that can affect the results. Few cases in the comparison group could have suffered with disorders close to schizophrenia as schizotypy or schizo affective disorder. Since two psychiatrists were involved in confirming the schizophrenia diagnosis, intra observer error might have been occurred.

4. CONCLUSION

In conclusion, the study findings revealed that schizophrenia was more prevalent in the Arab population residing in Qatar. Women were more likely than men to be adversely affected by schizophrenia disorders. The data revealed that a raised incidence of obstetric complications

was more common in people developing schizophrenia illness and Rhesus incompatibility and maternal stress were major predictors for schizophrenia. Urban upbringing, childhood trauma and social isolation produced a strikingly higher incidence of schizophrenia in patients in which urban upbringing and childhood trauma were significant contributors for schizophrenia.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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