Risk Factors Associated with Congenital Anomalies among Children Admitting Surgical Unit in Rapareen Pediatric Teaching Hospital in Erbil City

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ABSTRACT

Backgrounds and objectives: Congenital anomalies, which can affect how the body operates, are anatomical, functional, or metabolic abnormalities that develop during intrauterine life. The study aimed to identify risk factors associated with congenital anomalies among children who are admitting to the surgical unit at Rapareen Pediatric Teaching Hospital in Erbil city.

Methods: descriptive, case-control design was used to conduct this study. This study was conducted in Rapreen Pediatric Teaching Hospital in Erbil from 1st of July to 1st of October 2022. Non- probability purposive sample of 100 mothers with congenital anomalies children and admitted to the Surgical Unit and 100 mothers with other health condition children (control group) at Rapareen Pediatric Teaching Hospital were asked respectfully to participate in the study. Descriptive and frequency, Regression analytics was used for exploring the factors associated with congenital anomalies, Chi-square was used to find out the association between dependent and independent variables, and t-tests were used to identify the differences between case and control groups.

Results: the results show that that anemia in pregnancy, previous history of congenital anomalies, family history of congenital anomalies, Pesticide use, living near of mobile station, passive smoke, stress during pregnancy, didn't use folic acid, and drink of coffee during pregnancy had a very high statistical difference between case and control P-value <0.001, while Radiation exposure had a difference between case and control P-value of 0.045. That age of mothers and weight were factors which highly statistical associated with congenital anomalies among children P-value 0.001 and <0.001 respectively, moreover age of father and history of previous abortion were factors behind the congenital anomalies P-value 0.033 and 0.017 respectively.

Conclusions: the study concluded that age of mothers and father, weight, and history of previous abortion were factors behind the congenital anomalies. Primary prevention is most important to reduce the incidence of congenital anomalies and the morbidity associated with it.

Keywords: Congenital; Risk factor; Rapareen; Erbil.

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INTRODUCTION

Congenital anomalies also known as congenital malformations have been defined as a " structural or functional anomalies that occur during intrauterine life and can be identified prenatally, at birth, or sometimes may only be detected later in infancy". Congenital anomalies increase the risk of long term disability, an estimated 240 000 newborns die worldwide within 28 days of birth every year, and congenital anomalies also are the main causes of further 170 000 deaths of children between the ages of 1 month and 5 years [1]. Nearly 95% of the babies who died from congenital malformation were lived in middle- and low-income countries [2].The prevalence rates of conginatal anomalies are different from country to other country, the prevalence of congenital anomalies in Japan is low which 1.07% and as high as in Taiwan which is 4.3%, in US was 2-3%, in England has been reported is 2%, and in Lebanon has been estimated as 1.64% [3]. In Turkey, depend to the Turkish Statistical Institute congenital malformations and chromosomal anomalies were responsible for 1.23% of all causes of death in 2018[4]. In Iran the prevalence rate among children was estimated to be 2.3%, the total prevalence rates, in terms of gender, were more in boys (3%) than girls (2%) [5]. In 2007 high rate of congenital anomalies was reported from Bagdad city in Iraq which is estimated in 12.36 per 1000, in Al-Anabr was 8.5 per 1000 birth, however, a study from Erbil, Iraq on live births between 1990 and 1999 revealed an unexpected high rate of 23.9 congenital anomalies per 1000 live births [6]. Other study revealed that in Erbil city\ Iraq for about 35,803 recorded births, 130 mothers delivered newborns with congenital anomalies in Maternity teaching hospital from the time period of April 2015 to the March of 2016 [7].Babies are born Babies are born with congenital anomalies because of many causes and risk factors. For about 50% of congenital anomalies, causes are undefined yet, but the studies showed that 30-40% may due to genetic, 5 to 10% related to environment, chromosomal abnormality constitutes 6%, and multifactorial 20- 30% [3]. Reported that every year in 8 million births, 6% of total births are born with serious congenital anomalies of genetic or partially genetic origin. Additionally more than 100 \1000 are born with serious birth defects of post conception origin related to maternal exposure to environmental agents [8]. The study was conducted in Mardan (Pakistan) suggested that consanguineous marriages and lack of folic acid are the topmost risk factors that had the role to increasing rate of congenital anomalies [9]. Ameen and her colleagues in Erbil\Iraq (2018) showed that mothers with history of previous congenital anomalies, parental consanguinity, and mothers with medical disorder during pregnancy were risk factors for delivered babies with congenital anomalies [7]. A number of congenital anomalies can be prevented through many ways like vaccination, adequate intake of folic acid or iodine through fortification of staple foods or supplementation, and adequate care before and during a pregnancy are examples of prevention methods [1]. Knowing information about the risk factors of congenital anomalies is beneficial to obtain baseline rates of risk factors, documenting changes over time, and identifying clues to the etiology of conditions. This information is also helpful to plan and assess antenatal screening for congenital anomalies, especially for high-risk populations. The study aimed to identify factors associated with children with congenital anomalies who are admitted to the surgical unit at Rapareen

Pediatric Teaching Hospital in Erbil city.

METHODS

Quantitative design, descriptive- retrospective, case and control study were used to conduct this study. The study was carried out at Rapareen Pediatric Teaching Hospital (RPTH) in Erbil city. This study was conducted in Rapreen Pediatric Teaching Hospital in Erbil and the time interval was from 1st of July to 1st of October 2022. Non- probability purposive sample of 100 mothers, who born children with congenital anomalies and were admitted to the Surgical Unit at RPTH, and 100 mothers had children with other health conditions at RPTH were asked respectfully to participate in the study. Mothers who are willing to participate in the study, Child diagnosed by the related consultant surgeon and admitted to surgical department, and Child admitted to the surgery department and complained of congenital anomalies were included in the study. While, the congenital anomalies children are admitted to others sectors (Private hospitals), Orphan children (mother's die), and Mothers with psychological problems were excluded from the study. Data was collected by using a questionnaire format and was distributed by the investigator and thought direct (face to face) interview method with mothers have children with congenital anomalies , who kindly accept to participate in the study. The cases that fulfill the inclusion criteria were selected. The interviews were conducted at surgical unit of Rapareen Pediatric Teaching Hospital. To avoid extra crowded, the researcher attended the hospital during evening shift from 2 PM to 6 PM every other day, and each interview session took approximately (15-30) minutes. The questionnaire format was prepared by the investigator. The questionnaire includes the following parts.

After constructing the questionnaire, it will send to the number of experts in the fields of medicine, nursing, and biostatistics. The comments of experts were taken into consideration regarding clarity, relevancy, and adequacy to achieve the objectives. The reliability of the questionnaire was tested by the pilot test of 10 children with congenital anomalies, and who admitted to surgical unit at Raparin Teaching Hospital for children.Before data collection, formal permission was obtained from Hawler Medical University\ College of Nursing and Rapareen Pediatric Teaching Hospital for conducting the study (12)19-June-2022. A primary approval was obtained from the research ethics committee, Hawler Medical University/Nursing. Oral Informed consent was obtained from mothers before data collection, after the explanation of the purpose of the study, benefits, rights to privacy, and rights to withdraw at any time. The investigator promised to keep the information for confidential and anonymity. A pilot study was conducted on 10 % of the total sample of congenital anomaly babies to test the content validity and feasibility of designed tools and estimate the time required for filling the tool modifications will do accordingly. The data was analyzed by the statistical Package for the Social Sciences version 23 (SPSS). Frequency and Linear regression analytics for exploring the factors associated with congenital anomalies, Chi-square to find out the association between dependent and independent variables, and T-test test to identify the differences between case and control

RESULTS

The current results show that less than half of participants in case and control group were between the ages of 21-25 (46% and 48% respectively). Concerning the occupation of mothers 71% in case and 78% in

control were housewives, while more than half of participants in case and control groups were illiterate(54% and 63% respectively). More than half (53%) of mothers in case group lived in urban area while, the majority (72%) of mothers in control group lived in urban area. As for the economic status of participants, results showed that the highest parentage in case and control groups had satisfied with economic status for daily needs (66% and 80% respectively). The result showed that 40% of fathers in case group were between the ages of 26 -35 but, 37% of fathers in control group were between the ages of 21-25 years old Table 1.

Table 1: Assessment of Socio- demographic Characteristics of Mothers in Case and Control Group. (N0. 100: case and control)

Socio-demographics		Case Group		Control Group	
		No.	%	No.	(%)
Mother Age (years)	≤ 20	13	(13)	11	(11)
	21-25	46	(46)	48	(48)
	26-35	27	(27)	36	(36)
	≥ 36	14	(14)	5	(5)
Occupation	Housewife	71	(71)	78	(78)
	Governmental employee	14	(14)	8	(8)
	Private employee	11	(11)	8	(8)
	Student	4	(4)	6	(6)
Level of Education	Illiterate	54	(54)	63	(63)
	Able to read and write	16	(16)	11	(11)
	Primary school	8	(8)	1	(1)
	Secondary school	8	(8)	1	(1)
	Institute graduate	8	(8)	13	(13)
	College graduated	6	(6)	11	(11)
	Post graduated	0	(0)	0	(0)
Residency Areas	Rural	33	(33)	16	(16)
	Urban	53	(53)	72	(72)
	Suburban	14	(14)	12	(12)
Economic	sufficient for daily need	66	(66)	80	(80)
	Insufficient	24	(24)	16	(16)
	exceeds needs	10	(10)	2	(2)
Father Age (years)	≤ 20	5	(5)	5	(5)
	21-25	31	(31)	37	(37)
	26-35	40	(40)	27	(27)
	≥ 36	24	(24)	31	(31)

The result of current study in Table 2 shows that 58% of children in case and 67% of children in control were ages between 1days -1 years old, while more than half (56%) of children in case and 43% of children in control group were male. Concerning the gestational age 40% in case and 47% in control were preterm. The weight of children accounted as 62% in case group and 68% in control were between (1-10kg). The majority of mothers in case and control groups hadn't history of abortion (85% and 80% respectively).

Table 2: Assessment of demographic characteristics of children.

Children characteristics		Case Group		Control Group	
		No.	(%)	No.	(%)
Child age	1days-1years	58	(58)	67	(67)
	1years-3years	26	(26)	20	(20)
	3years-6years	14	(14)	8	(8)
	≥ 7 years	2	(2)	5	(5)
Gender	Male	56	(56)	43	(43)
	Female	44	(44)	57	(57)
Gestational age	Preterm	40	(40)	47	(47)
	Term	45	(45)	45	(45)
	post term	15	(15)	8	(8)
Weight (kg)	1-10	62	(62)	68	(68)
	11-20	20	(20)	19	(19)
	21-30	16	(16)	9	(9)
	≥ 31	2	(2)	4	(4)
Abortion	None	85	(85)	80	(80)
	1-3	14	(14)	12	(12)
	4-6	1	(1)	8	(8)
	≥ 7	0	(0)	0	(0)

Concerning the types of congenital anomalies (Fig.1) the result of chart shows that 41% of case groups had genitourinary anomalies, 33% had digestive anomalies, 10% hand musculoskeletal anomalies, 7% of case had respiratory anomalies, 6% had circulatory anomalies, and 8% had other anomalies.

Table 3 show comparison between case and control regarding risk factors associated with congenital anomalies, concerning consanguinity, medical disease, andoligohydramina , there was a highly statistical difference shown between case and control with P. Value (<0.001, <0.001, and 0.001 respectively), while there was no statistical difference happen between case and control regarding polyhydramine with P.value= 0.150. The result of study indicated that anemia in pregnancy, previous history of congenital anomalies, family history of congenital anomalies, Pesticide use, living near of mobile station, passive smoking, stress during pregnancy, didn't using folic acid, and drink of coffee during pregnancy had a very high statistical difference between case and control P. Value <0.001, while Radiation exposure had a difference between case and control P. Value=0.045. At the same time there was no statistical difference happen between case and control regarding using of unprescribed medication ,Chemical substance use, living near electrical tower,active smoker during pregnancy, infection during pregnancy, and having corona virus which (P. Value = 0.098, 1.00, 0.857, 1.000, 0.723, and 0.055) respectively.

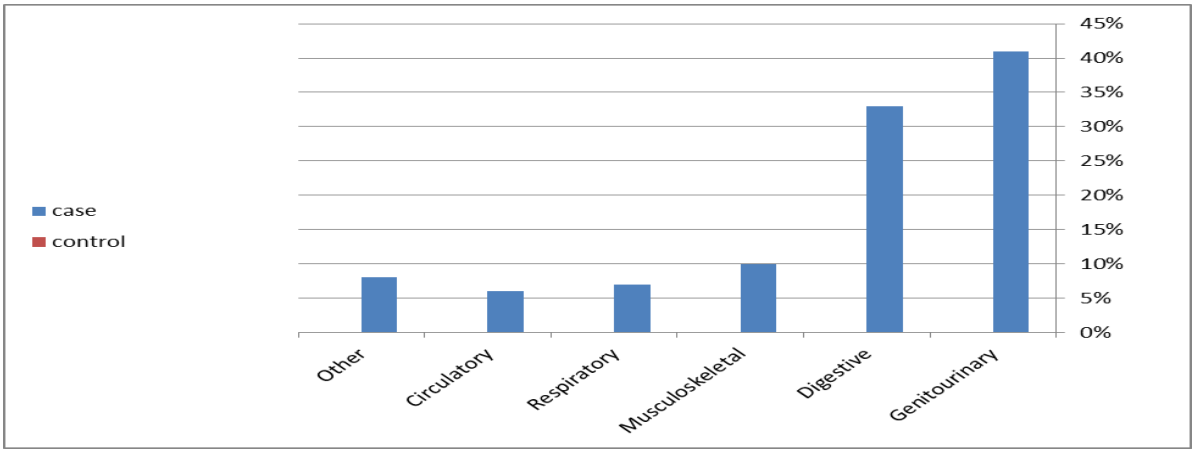

Figure 1: Types of congenital anomalies

Table 3: Compare between case and control regarding risk factors associated congenital anomalies. (n. 100 case and control).

Risk factors associated with congenital anomalies	Group	N	Mean	SD	F	P-value	T	95% confidence interval the difference	
								Lower	Upper
Consanguinity	Case	100	0.68	0.4688	35.45	0.001	-2.87	-0.2864	-0.05357
	Control	100	0.850	0.3588			-2.87	-0.2864	-0.05352
Medical Dis-	Case	100	0.780	0.4163	44.05	0.001	-3.06	-0.2464	-0.05357
ease	Control	100	0.930	0.2564			-3.06	-0.2465	-0.05345
Oligohydrami-	Case	100	0.900	0.3015	11.70	0.001	-1.66	-0.1310	0.01102
nas	Control	100	0.960	0.1969			-1.66	-0.1310	0.01109
Polyhydrami-	Case	100	0.950	0.2190	2.089	0.150	-0.719	-0.0748	0.03485
nous	Control	100	0.970	0.1714			-0.719	-0.0748	0.03487
Anaemia	Case	100	0.800	0.4020	21.43	0.001	-2.22	-0.2074	-0.01252
	Control	100	0.910	0.2876			-2.22	-0.2075	-0.01246
Previous congeni-	Case	100	0.830	0.3775	27.02	0.001	-2.46	-0.1980	-0.02192
tal anomalies	Control	100	0.940	0.2386			-2.46	-0.1981	-0.02182
Family history	Case	100	0.780	0.4163	66.08	0.001	-3.61	-0.2627	-0.07723
	Control	100	0.950	0.2190			-3.61	-0.2629	-0.07705
Unprescribed	Case	100	0.980	0.1407	2.768	0.098	0.826	-0.0277	0.06773
medication use	Control	100	0.960	0.1969			0.826	-0.0277	0.06776
Radiation	Case	100	0.990	0.1000	4.082	0.045	-1.00	-0.0297	0.00972
	Control	100	1.00	0.0010			-1.00	-0.0298	0.00984
Chemical	Case	100	0.960	0.1969	0.001	1.00	0.001	-0.0549	0.05493
substance use	Control	100	0.960	0.1969			0.001	-0.0549	0.05493
Pesticide use	Case	100	0.770	0.4229	73.80	0.001	-3.77	-0.2739	-0.08607
	Control	100	0.950	0.2190			-3.77	-0.2741	-0.08588
Mobile station	Case	100	0.830	0.3775	73.50	0.001	-3.72	-0.2294	-0.07055
	Control	100	0.980	0.1407			-3.72	-0.2297	-0.07027
Electrical tower	Case	100	0.900	0.3015	0.032	0.857	-1.70	-0.3882	0.02821
	Control	100	1.08	1.011			-1.70	-0.3891	0.02911
Active smoker	Case	100	0.940	0.2386	0.001	1.00	0.001	-0.0665	0.06657
	Control	100	0.940	0.2386			0.001	-0.0665	0.06657
Passive smoker	Case	100	0.710	0.4560	20.56	0.001	-2.21	-0.2456	-0.01438
	Control	100	0.840	0.3684			-2.21	-0.2456	-0.01435
Stress	Case	100	0.820	0.3861	19.29	0.001	-2.11	-0.1932	-0.00679
	Control	100	0.920	0.2726			-2.11	-0.1932	-0.00672
Didn't use Folic	Case	100	0.920	0.2726	41.30	0.001	-2.93	-0.1337	-0.02623
acid	Control	100	1.00	0.0001			-2.93	-0.1341	-0.02590
Coffee drink	Case	100	0.890	0.3144	15.22	0.001	-1.88	-0.1431	0.00317
	Control	100	0.960	0.1969			-1.88	-0.1432	0.00326
Infection	Case	100	0.810	0.3942	0.126	0.723	0.178	-0.1010	0.12104
	Control	100	0.800	0.4020			0.178	-0.1010	0.12104
Corona virus	Case	100	0.870	1.106	3.718	0.055	-0.174	-0.2469	0.20693
	Control	100	0.890	0.3144				-0.2479	0.20795

Table 4 shows that age of mothers and weight were factors which highly statistical associated with congenital anomalies P.value (0.001 and <0.001 respectively), at the same time age of father and history of previous abortion were factors behind the congenital anomalies p.value (0.033 and 0.017 respectively).

Table 4: Factors associated with congenital anomalies

Selected factors	Unstandardized Coefficients		Standardized Coefficients	t	P-val-ue	95% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	-0.390	0.156		-2.495	0.015	-0.701	-0.079
Age mother	0.137	0.041	0.152	3.360	0.001	0.056	0.219
Occupation	-0.004	0.049	-0.004	-0.078	0.938	-0.101	0.094
Level education	0.025	0.026	0.050	0.943	0.349	-0.028	0.078
Residency	-0.008	0.055	-0.006	-0.138	0.891	-0.117	0.101
Economic	-0.040	0.060	-0.034	-0.676	0.501	-0.159	0.078
Father age	0.102	0.047	0.109	2.165	0.033	0.008	0.196
Abortion	-1.125	0.462	-0.140	-2.436	0.017	-2.045	-0.206
Gender	-0.056	0.073	-0.035	-0.760	0.449	-0.202	0.090
Gestational age	0.018	0.051	0.016	0.357	0.722	-0.083	0.119
Weight	0.974	0.230	1.006	4.234	0.001	0.516	1.432

DISCUSSION

The majority of children are born with congenital anomalies and they are impacted physically, mentally or socially, or it may be have a chance to boosting the risk of morbidity related to many health problems.

Based on the analysis presented in the results, less than half, respectively, of participants in the case and control groups were aged between (21-25) years, This result is similar to a case-control study carried out in Ethiopia, which revealed that less than half of samples in the case and control groups were between 21 and 25 years old, and disagrees with the study done in Iran, which reported that the mean mothers age was 29.48 years in the case group and 27.9 years in the control group [10, 11]. Concerning the occupation of mothers nearly three quarter of case and two-thirds in control were housewives, This result matches with a case-control study reported in Ethiopia (2021) which mentioned that number of participants in case and control were housewife [10], and also same with the case-control study done in Erbil city which indicated that the most of mothers in both groups were housewives [7]. Regarding the level of education of participants, more than half in case and control groups were illiterate, this finding disagreed with the study which was carried out in Saudi Arabia which stated that

more than half in case and control were schooling up to high school [12]. More than half in case group lived in urban area while, the majority of mothers in control group lived in urban area. The study done in Ethiopia which stated that less than half of mothers in case group lived in urban area, at the same time, the majority of mothers in control group lived in urban area [13].the area of living is effect on mother's knowledge and awareness regarding congenital anomalies and safe pregnancy, newborn care and antenatal care during pregnancy. The majority in case and control groups had satisfied with economic status for daily needs. The study carried out in Riyadh, Saudi Arabia mentioned that less than half of participant in case and control hand satisfied family monthly income [12]. The study done Ethiopia in 2018 reported that totally 47.8% of samples in both groups had middle economic status [13]. The result showed that less than half of fathers in case group was between the ages of (26-35) meanwhile, one-third of fathers in control group were between the ages of (21-25). This result nearly agreed with the study which is done in Ethiopia which revealed that 40% in case was their ages ranged between 26-34 but, 29.7% samples in control group aged was <=25 [10].More than half of children in case and 43% of children in control group were male. This finding is agreed with the study which carried out in Egypt which reported that more than half of children in case and less than half of children in control were male, but, disagreed with the study done in Nepal which mentioned that more than half of children in case and less than half of children control was girl [2,14]. Concerning the gestational age 40% in case and 47% in control were preterm. This outcome unsupported with the case-control study which carried out in Egypt which announced that the majority of children in both group were full term [2]. The weight of children accounted as more than half in case and control group were between (1-10kg). The study carried out in Brazil which stated that most of the children in case and control were normal weight [15]. The majority of mothers in case and control groups hadn't history of abortion. This result supported with the case-control study which was carried out in Erbil city in Iraq which announced that majority of mothers in case and control hadn't history of abortion [7]. As in my experience during my duty I detected mothers with multiple abortions are risk of having infants with congenital anomalies in comparison with others mothers. Regarding the assessment the types of congenital anomalies in current study, the results show in Fig.1 that the most of congenital anomalies are shown in genitourinary system, this finding is matches with prospective study which is done in Punjab (India) which indicated that major defects were present in 68.11%. CNS and urogenital systems were most commonly involved [16], and disagreed with the study of done in Erbil city in Iraq which mentioned that the most common area for anomalies was the central nervous system (37.7%) followed by the musculoskeletal (23.1%) and gastrointestinal systems (20.8%) [7]. Table 3 explains the Compare between case and control regarding risk factors associated with congenital anomalies. Concerning consanguinity, medical disease, oligohydramina, anaemia in pregnancy, previous history of congenital anomalies, family history of congenital anomalies, Pesticide use, living near of mobile station, passive smoking, stress during pregnancy, not using folic acid, and drink of coffee during pregnancy, there was a highly statistical difference shown between case and control. Iraq in which mentioned that there were

high statistical differences shown between case and control regarding consanguinity, medical disease, and oligohydramina [7]. The prospective analytic cross sectional study carried out in Neonatal Intensive Care Unit in Egypt announced that consanguinity and family history of congenital anomalies were a high statistical difference shown between case and control but, mentioned that there were no statistical differences shown between case and control regarding having medical diseases and drug use during pregnancy [17]. Other study done in India indicated that there were no statistical difference shown between case and control regarding having medical diseases and history of anemia during pregnancy [18]. The study which was done in India mentioned that there was a statistical difference happen between case and control regarding consanguinity, previous child with congenital anomalies, and no intake of Iron/Folic acid. Still, there were no statistical difference happen between case and control regarding medical disease and anemia during pregnancy [19]. The result of the current study shows that radiation exposure had a difference between case and control, this finding is unequal with the study done in Hamadan which mentioned that there was no statistical difference happens between case and control regarding radiography during pregnancy, stressful pregnancy, medical disease, oligohydramina, exposure to chemicals and family medical history of congenital anomalies [20]. Another study in China mentioned that there were a highly statistical difference shown between case and control regarding family history of congenital anomalies, stressful life events, taking folic acid, and smoking, while there was no statistical difference shown between case and control regarding medical disease during pregnancy [21]. The study which carried out the study in Ethiopia mentioned that there was a high statistical difference occurred between case and control regarding passive smoking, folic acid use during pregnancy, and exposure to pesticides. Still, announced that there was no statistical difference between case and control regarding drinking coffee during pregnancy [10]. Other studies in India mentioned that there were statistical differences occurred between case and control regarding living near mobile station and passive smoking [8]. Table 4 showed that weight was factor which highly statistically associated with occurrence of congenital anomalies and a history of previous abortion was a factor behind the congenital anomalies. The case-control study done in Erbil city showed that the weight of children was a factor which highly statistically associated with the occurrence of congenital anomalies, and the history of previous abortion was the factor behind the congenital anomalies [7]. The result of the current study indicated that the age of mothers factors which highly statistical associated with occurrence of congenital anomalies. This result is agreed with the study done in Nepal which reported that the age of mothers was a factors that highly statistical associated with congenital anomalies, but mentioned that the weight of children wasn't a factors that statistical associated with congenital anomalies [14]. Another study in India showed that the weight of the mother and history of abortion were a factors that statistical significant with congenital anomalies [8]. The research carried out in Egypt found that the age of mother and the history of previous abortion didn't factors that causes for congenital anomalies [17]. The result of study indicated that father age is a factor that statistically significant with congenital anomalies. This outcome is supported by the study done in Mexico

which mentioned that father age and birth weight are factors that highly statistically significant with congenital anomalies [22] also, equal to the study which was done in Iran which stated that father age is a factor that statistical significant with congenital anomalies [11]. Early marriage and early and late pregnancy are increase the risk of having children with congenital anomalies because of the anatomical and functional maturation of reproductive organs.

Conclusion

The finding reported that consanguinity, medical disease, oligohydramina, anaemia in pregnancy, previous history of congenital anomalies, family history of congenital anomalies, Pesticide use, living near of mobile station, passive smoking, stress during pregnancy, not using folic acid, radiation exposure and drink of coffee during pregnancy, there was a highly statistical difference shown between case and control. The results were indicated that that age of mothers and weight were factors which highly statistically associated with congenital anomalies, and at the same time age of father and history of previous abortion were factors behind the congenital anomalies

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