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RESEARCH ARTICLE

THE PATTERN OF NASOPHARYNGEAL CARCINOMA IN SAUDI ARABIA: A DESCRIPTIVE EPIDEMIOLOGICAL STUDY OF DATA FROM SAUDI CANCER REGISTRY 2002-2013.

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Abstract

This study describes the epidemiological data of nasopharyngeal carcinoma (NPC) cases diagnosed from 2002 to 2013 among male and female Saudis, including crude incidence rate (CIR) and age-adjusted incidence rate stratified by age group, region, gender, and year of diagnosis. It is an epidemiological analysis of all NPC cases registered in the Saudi Cancer Registry (SCR) from 2002 to 2013. The statistical analyses were performed using parametric test to identify the significant differences between regions and genders, with focusing on the overall CIR and age-adjusted incidence rate stratified by region, gender, and year of diagnosis. The region of Qassim had the highest overall age-adjusted incidence rate of NPC among male Saudis from 2002 to 2013. While, the region of Jouf had the highest overall age-adjusted incidence rate of NPC among female Saudis from 2002 to 2013. In addition, the region of Jazan had the lowest overall age-adjusted incidence rate of NPC among male and female Saudis from 2002 to 2013. The age groups within the range of (60-74 and 45-59) were highest affected by NPC among both genders. However, the age-adjusted incidence rates of NPC were significantly higher in Saudi male than in female with approximately ratio of 2:1. This study revealed that the region of Qassim is the best geographic area in Saudi Arabia to study the major risk factors of NPC among male Saudis. While, the region of Jouf is the best geographic area to study the major risk factors of NPC among female Saudis. Furthermore, the region of Jazan is the best geographic area in Saudi Arabia to study the most important protective factors of NPC among male and female Saudis.

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Introduction:-

Nasopharyngeal carcinoma (NPC) is a rare malignancy in many countries of the world, with an estimated age-adjusted incidence rate less than 1 per 100,000 population.¹⁻² The prevalence of NPC is very high in South China, with an estimated 20 to 40 cases per 100,000 population.³ The incidence rates of NPC are also observed higher in some countries of Southeast Asia, such as Singapore (15 per 100,000 population), Malaysia (9.7 per 100,000), and

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Philippines (6.4 per 100,000).⁴ In addition, the country of Kenya is the highest area affected by NPC in Africa, with an estimated incidence rate (5.4 per 100,000 population).⁴

There are many epidemiological studies have reported several risk factors of NPC which included gender, ethnicity, certain type of diet, infection with Epstein-Barr virus (EBV), genetic factors and family history. The incidence of NPC is approximately twice in males than in females, while the most common geographic area affected by NPC is Southern China. In addition, eating diets with high salt cured fish and meat may contribute to increase the incidence rate of NPC. The relationship between EBV infection and NPC is not clear, since the world's population has been infected with this virus and the NPC is rare. Furthermore, some studies have shown that the genetic factors through certain inherited tissue types are a risk factor of developing NPC. However, family history through inherited genes has not been confirmed as a risk factor for NPC.⁵

In Saudi Arabia, the International Agency for Research on Cancer estimated that the age-adjusted incidence rate of NPC among male and female Saudis was 1.3 per 100,000 population in 2012, and the age-adjusted mortality rates was 0.7 per 100,000 population.⁶⁻⁷ The purpose of this study is to describe the pattern of NPC among male and female Saudis from 2002 to 2013, with focusing on the CIR and age-adjusted incidence rate, stratified by gender, region, and year of diagnosis. However, we were very excited to study the epidemiological pattern of the NPC in Saudi Arabia, because, in fact, it is a living experience and suffering for the second author.

Materials and methods:-

This is a retrospective descriptive epidemiological study of all NPC cases in the Saudi population diagnosed from 2002 to 2013. The data is reported and managed by the Saudi Cancer Registry (SCR), which is a population based cancer registry that was established by the Ministry of Health in 1994. However, the most recent available dataset from the SCR was in 2013. Based on the annual Saudi cancer reports, there are a huge data for 13 administrative regions from 2002 to 2013 that describe the CIR and age-adjusted incidence rate, stratified by the provinces of Saudi Arabia, age group, gender of cases and year of diagnosis. The overall CIRs and age-adjusted incidence rates of NPC were calculated from 2002 to 2013. Furthermore, the significant differences in age-adjusted incidence rate of NPC among genders and regions, were statistically tested by using the Statistical Package for Social Sciences (SPSS) version 20.0 (IBM Corporation, Armonk, NY, USA).

Results:-

The Pattern of Nasopharyngeal Carcinoma in the region of Asir and Baha:

A total of 128 NPC cases were documented in the region of Asir by the SCR from 2002 to 2013. The overall CIRs of NPC among male and female Saudis living in Asir from 2002 to 2013 per 100,000 persons, were estimated at (1.0 and 0.5 Per 100,000 male/female). In addition, the overall age-adjusted incidence rates of NPC among male and female were estimated at (1.5 and 0.6 Per 100,000 male/female). However, there were no statistically differences in the rates of NPC between the region of Asir and other provinces of Saudi Arabia, except the region of Qassim, (F [12,143] = 6.848; P-Value < 0.05), among male Saudis (95% CI: -2.4 – 0.5).

A total of 21 NPC cases were documented in the region of Baha by the SCR from 2002 to 2013. The overall CIRs of NPC among male and female Saudis living in Baha from 2002 to 2013 per 100,000 persons, were estimated at (0.7 and 0.4 Per 100,000 male/female). In addition, the overall age-adjusted incidence rates of NPC among male and female were estimated at (1.0 and 0.5 Per 100,000 male/female). However, there were no statistically differences in the rates of NPC between the region of Baha and other provinces of Saudi Arabia, except the region of Qassim and Riyadh, (F [12,143] = 6.848; P-Value < 0.05), among male Saudis in Qassim (95% CI: -2.4 – - 0.5), and in Riyadh (95% CI: -2.6 – - 0.2) (Table 1).

	Asir						Baha					
	No of Cases		CIR		Age-adjusted incidence rate		No of Cases		CIR		Age-adjusted incidence rate	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
2013	6	1	0.7	0.1	0.8	0.1	0	1	0.0	0.5	0.0	0.7
2012	9	7	1.1	0.8	1.7	1.1	0	1	0.0	0.5	0.0	0.7
2011	6	5	0.7	0.6	1.0	0.7	1	0	0.6	0.0	0.6	0.0
2010	11	7	1.4	0.9	1.9	1.1	1	0	0.6	0.0	1.1	0.0
2009	4	1	0.5	0.1	0.6	0.1	3	2	1.8	1.1	2.6	1.4
2008	6	2	0.8	0.3	1.1	0.4	1	0	0.6	0.0	0.5	0.0
2007	5	2	0.7	0.3	1.0	0.4	0	1	0.0	0.6	0.0	0.8
2006	7	2	1.0	0.3	1.1	0.2	1	1	0.6	0.6	0.8	0.9
2005	9	2	1.3	0.8	1.9	0.4	2	2	1.3	1.1	1.4	1.3
2004	9	4	1.3	0.5	2.3	0.9	2	0	1.3	0.0	2.3	0.0
2003	12	2	1.8	0.3	3.1	0.4	0	0	0.0	0.0	0.0	0.0
2002	5	4	0.8	0.6	1.4	1.2	2	0	1.4	0.0	3.0	0.0
Overall	7	3	1.0	0.5	1.5	0.6	1.1	0.7	0.7	0.4	1.0	0.5
Total	89	39					13	8				

Table 1:- The overall CIR and age-adjusted incidence rate of nasopharyngeal carcinoma among male and female Saudis in the region of Asir and Baha, from 2002 to 2013.

The Pattern of Nasopharyngeal Carcinoma in the region of Jazan and Najran:

A total of 49 NPC cases were documented in the region of Jazan by the SCR from 2002 to 2013. The overall CIRs of NPC among male and female Saudis living in Jazan from 2002 to 2013 per 100,000 persons, were estimated at (0.5 and 0.3 Per 100,000 male/female). In addition, the overall age-adjusted incidence rates of NPC among male and female were estimated at (0.6 and 0.4 Per 100,000 male/female). Furthermore, the region of Jazan recorded the lowest rates of NPC among male and female in Saudi Arabia. However, there were no statistically differences in the rates of NPC among the region of Jazan and other provinces of Saudi Arabia, except the region of Qassim and Riyadh, (F [12,143] = 6.848; P-Value < 0.05), among male Saudis in Qassim (95% CI: -3.2 – - 0.9), and in Riyadh (95% CI: -3.0 – - 0.6).

A total of 18 NPC cases were documented in the region of Najran by the SCR from 2002 to 2013. The overall CIRs of NPC among male and female Saudis living in Najran from 2002 to 2013 per 100,000 persons, were estimated at (0.6 and 0.2 Per 100,000 male/female). In addition, the overall age-adjusted incidence rates of NPC among male and female were estimated at (1.3 and 0.3 Per 100,000 male/female). However, there were no statistically differences in

the rates of NPC between the region of Najran and other provinces of Saudi Arabia, except the region of Qassim and Riyadh, (F [12,143] = 6.848; P-Value < 0.05), among male Saudis in Qassim (95% CI: -2.6 – - 0.2), and in Riyadh (95% CI: -2.4 – - 0.1) (Table 2).

	Jazan						Najran					
	No of Cases		CIR		Age-adjusted incidence rate		No of Cases		CIR		Age-adjusted incidence rate	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
2013	4	2	0.7	0.3	0.9	0.3	1	0	0.5	0.0	0.3	0.0
2012	2	1	0.3	0.2	0.3	0.2	3	1	1.4	0.5	3.1	0.3
2011	3	0	0.5	0.0	0.7	0.0	2	0	1.0	0.0	1.4	0.0
2010	5	1	0.9	0.2	1.0	0.2	1	0	0.5	0.0	1.2	0.0
2009	2	0	0.4	0.0	0.6	0.0	1	0	0.5	0.0	1.2	0.0
2008	5	1	1.0	0.2	1.3	0.2	0	2	0.0	1.0	0.0	2.4
2007	3	2	0.6	0.4	0.6	0.5	1	0	0.5	0.0	0.8	0.0
2006	3	1	0.6	0.2	0.7	0.3	2	0	1.1	0.0	2.5	0.0
2005	4	0	0.8	0.0	1.4	0.0	0	0	0.0	0.0	0.0	0.0
2004	0	3	0.0	0.6	0.0	0.8	1	0	0.6	0.0	0.5	0.0
2003	0	2	0.0	0.4	0.0	0.6	0	1	0.0	0.6	0.0	1.0
2002	0	5	0.0	1.0	0.0	1.1	2	0	1.2	0.0	4.0	0.0
Overall	2.6	1.5	0.5	0.3	0.6	0.4	1.2	0.3	0.6	0.2	1.3	0.3
Total	31	18					14	4				

Table 2:- The overall CIR and age-adjusted incidence rate of nasopharyngeal carcinoma among male and female Saudis in the region of Jazan and Najran, from 2002 to 2013.

The Pattern of Nasopharyngeal Carcinoma in the region of Hail and Qassim:

A total of 34 NPC cases were documented in the region of Hail by the SCR from 2002 to 2013. The overall CIRs of NPC among male and female Saudis living in Hail from 2002 to 2013 per 100,000 persons, were estimated at (0.7 and 0.5 Per 100,000 male/female). In addition, the overall age-adjusted incidence rates of NPC among male and female were estimated at (0.9 and 0.7 Per 100,000 male/female). However, there were no statistically differences in the rates of NPC between the region of Hail and other provinces of Saudi Arabia, except the region of Qassim, and Riyadh (F [12,143] = 6.848; P-Value < 0.05), among male Saudis in Qassim (95% CI: -3.0 – 0.6), and in Riyadh (95% CI: -2.7 – 0.4).

A total of 139 NPC cases were documented in the region of Qassim by the SCR from 2002 to 2013. The overall CIRs of NPC among male and female Saudis living in Qassim from 2002 to 2013 per 100,000 persons, were estimated at (1.9 and 0.7 Per 100,000 male/female). In addition, the overall age-adjusted incidence rates of NPC among male and female were estimated at (2.7 and 1.0 Per 100,000 male/female). Furthermore, the region of Qassim recorded the highest rate of NPC among male in Saudi Arabia. However, there were statistically differences in the rates of NPC between the region of Qassim and other provinces of Saudi Arabia, except the region of Madinah, Riyadh, Makkah, and eastern region (F [12,143] = 6.848; P-Value > 0.05), among male Saudis in Madinah (95% CI: 0.1 – 2.3), in Riyadh (95% CI: 0.1 – 1.4), in Makkah (95% CI: 0.2 – 2.1), and in eastern region (95% CI: 0.2 – 2.2) (Table 3).

	Hail						Qassim					
	No of Cases		CIR		Age-adjusted incidence rate		No of Cases		CIR		Age-adjusted incidence rate	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
2013	4	1	1.5	0.4	2.0	0.6	14	3	2.8	0.6	3.1	1.0
2012	0	0	0.0	0.0	0.0	0.0	9	3	1.8	0.6	2.5	0.8
2011	3	0	1.2	0.0	1.6	0.0	9	3	1.9	0.6	2.2	0.8
2010	2	0	0.8	0.0	1.0	0.0	10	2	2.1	0.4	3.1	0.3
2009	1	0	0.4	0.0	0.7	0.0	9	4	2	0.9	2.6	1.8
2008	0	1	0.0	0.4	0.0	0.4	9	3	2.0	0.7	3.0	0.9
2007	2	0	0.9	0.0	1.0	0.0	9	7	2.1	1.6	2.8	2.0
2006	0	5	0.0	2.1	0.0	2.8	8	2	1.9	0.5	2.5	1.1
2005	3	0	1.3	0.0	1.7	0.0	6	3	0.8	0.4	1.3	0.7
2004	3	0	1.4	0.0	1.6	0.0	5	4	1.2	1.0	1.9	1.7
2003	1	5	0.5	2.2	0.6	2.8	6	1	1.5	0.3	3.4	0.4
2002	1	2	0.5	0.9	0.6	1.7	8	2	2.1	0.5	4.3	0.5
Overall	1.7	1.2	0.7	0.5	0.9	0.7	8.5	3.1	1.9	0.7	2.7	1.0
Total	20	14					102	37				

Table 3:- The overall CIR and age-adjusted incidence rate of nasopharyngeal carcinoma among male and female Saudis in the region of Hail and Qassim, from 2002 to 2013.

The Pattern of Nasopharyngeal Carcinoma in the region of Madinah and Jouf:

A total of 132 NPC cases were documented in the region of Madinah by the SCR from 2002 to 2013. The overall CIRs of NPC among male and female Saudis living in Madinah from 2002 to 2013 per 100,000 persons, were estimated at (1.1 and 0.6 Per 100,000 male/female). In addition, the overall age-adjusted incidence rates of NPC among male and female were estimated at (1.6 and 0.9 Per 100,000 male/female). However, there were no statistically differences in the rates of NPC between the region of Madinah and other provinces of Saudi Arabia, except the region of Qassim, and Riyadh, P-Value > 0.05.

A total of 44 NPC cases were documented in the region of Jouf by the SCR from 2002 to 2013. The overall CIRs of NPC among male and female Saudis living in Jouf from 2002 to 2013 per 100,000 persons, were estimated at (1.2 and 0.9 Per 100,000 male/female). In addition, the overall age-adjusted incidence rates of NPC among male and female were estimated at (2.2 and 1.6 Per 100,000 male/female). Furthermore, the region of Jouf recorded the highest rate of NPC among female in Saudi Arabia. However, there were no statistically differences in the rates of NPC between the region of Jouf and other provinces of Saudi Arabia, except the region of Baha, Jazan, Najran, and eastern region (F [12,143] = 6.848; P-Value < 0.05), among female Saudis in Baha (95% CI: 0.07 – 2.1), in Jazan (95% CI: 0.2 – 2.2), in Najran (95% CI: 0.2 – 2.2), and in eastern region (95% CI: 0.1 – 2.0) (**Table 4**).

	Madinah						Jouf					
	No of Cases		CIR		Age-adjusted incidence rate		No of Cases		CIR		Age-adjusted incidence rate	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
2013	11	8	1.6	1.2	2.4	1.7	2	4	1.0	2.1	2.0	3.4
2012	3	2	0.5	0.3	0.8	0.5	4	0	2.1	0.0	3.0	0.0
2011	6	5	0.9	0.8	1.4	1.4	2	4	1.1	2.2	2.2	3.6
2010	15	4	2.4	0.6	3.0	0.8	3	0	1.7	0.0	2.1	0.0

2009	3	3	0.5	0.5	0.8	0.8	2	1	1.2	0.6	2.1	1.2
2008	7	1	1.1	0.2	1.7	0.3	4	3	2.3	1.8	3.9	2.2
2007	7	5	1.1	0.8	1.6	1.1	0	3	0.0	1.9	0.0	3.9
2006	10	6	1.7	1.0	2.4	1.2	2	0	1.2	0.0	2.5	0.0
2005	6	3	0.4	0.2	0.8	0.4	2	0	1.3	0.0	2.9	0.0
2004	6	4	1.1	0.7	1.9	1.2	3	1	1.9	0.6	2.7	1.5
2003	4	7	0.7	1.2	1.3	1.7	0	1	0.0	0.7	0.0	0.8
2002	6	0	1.1	0.0	1.6	0.0	1	2	0.7	1.4	2.8	2.0
Overall	7	4	1.1	0.6	1.6	0.9	2.1	1.6	1.2	0.9	2.2	1.6
Total	84	48					25	19				

Table 4:- The overall CIR and age-adjusted incidence rate of nasopharyngeal carcinoma among male and female Saudis in the region of Madinah and Jouf, from 2002 to 2013.

The Pattern of Nasopharyngeal Carcinoma in the region of Tabuk and Northern Region:

A total of 55 NPC cases were documented in the region of Tabuk by the SCR from 2002 to 2013. The overall CIRs of NPC among male and female Saudis living in Tabuk from 2002 to 2013 per 100,000 persons, were estimated at (0.9 and 0.5 Per 100,000 male/female). In addition, the overall age-adjusted incidence rates of NPC among male and female were estimated at (1.7 and 0.9 Per 100,000 male/female). However, there were no statistically differences in the rates of NPC between the region of Tabuk and other provinces of Saudi Arabia, P-Value > 0.05.

A total of 16 NPC cases were documented in the northern region by the SCR from 2002 to 2013. The overall CIRs of NPC among male and female Saudis living in the northern region from 2002 to 2013 per 100,000 persons, were estimated at (0.5 and 0.5 Per 100,000 male/female). In addition, the overall age-adjusted incidence rates of NPC among male and female were estimated at (0.8 and 0.8 Per 100,000 male/female). However, there were no statistically differences in the rates of NPC between the northern region and other provinces of Saudi Arabia, except the region of Qassim and Riyadh (F [12,143] = 6.848; P-Value < 0.05), among male Saudis in Qassim (95% CI: -3.1 – -0.7), and in Riyadh (95% CI: -2.9 – -0.5) (Table 5).

	Tabuk						Northern Region					
	No of Cases		CIR		Age-adjusted incidence rate		No of Cases		CIR		Age-adjusted incidence rate	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
2013	6	2	1.6	0.6	3.7	0.5	2	3	1.4	2.0	1.9	2.8
2012	2	3	0.6	0.9	0.6	1.1	0	0	0.0	0.0	0.0	0.0
2011	5	0	1.4	0.0	3.1	0.0	1	0	0.7	0.0	0.6	0.0
2010	3	1	0.9	0.3	1.7	0.5	0	1	0.0	0.7	0.0	1.4
2009	1	2	0.3	0.6	1.1	1.5	0	1	0.0	0.8	0.0	1.7
2008	3	1	0.9	0.3	1.5	0.5	1	0	0.8	0.0	1.3	0.0
2007	5	2	1.5	0.6	3.1	0.5	2	0	1.6	0.0	1.7	0.0
2006	2	2	0.6	0.7	1.1	1.8	0	0	0.0	0.0	0.0	0.0
2005	1	1	0.3	0.3	0.2	0.9	1	0	0.8	0.0	1.9	0.0
2004	1	1	0.3	0.3	0.8	0.9	1	1	0.8	0.3	1.8	0.9
2003	4	2	1.3	0.7	2.5	1.2	0	0	0.0	0.0	0.0	0.0
2002	3	2	1.0	0.7	1.4	1.1	0	2	0.0	1.8	0.0	2.8
Overall	3	1.6	0.9	0.5	1.7	0.9	0.7	0.7	0.5	0.5	0.8	0.8
Total	36	19					8	8				

Table 5:- The overall CIR and age-adjusted incidence rate of nasopharyngeal carcinoma among male and female Saudis in the region of Tabuk and Northern region, from 2002 to 2013.

The Pattern of Nasopharyngeal Carcinoma in the region of Riyadh and Makkah:

A total of 539 NPC cases were documented in the region of Riyadh by the SCR from 2002 to 2013. The overall CIRs of NPC among male and female Saudis living in Riyadh from 2002 to 2013 per 100,000 persons, were estimated at (1.6 and 0.6 Per 100,000 male/female). In addition, the overall age-adjusted incidence rates of NPC among male and female were estimated at (2.5 and 0.9 Per 100,000 male/female). However, there were statistically differences in the rates of NPC between the region of Riyadh and other provinces that mentioned in the above results, P-Value < 0.05.

A total of 403 NPC cases were documented in the region of Makkah by the SCR from 2002 to 2013. The overall CIRs of NPC among male and female Saudis living in the Makkah from 2002 to 2013 per 100,000 persons, were estimated at (1.2 and 0.5 Per 100,000 male/female). In addition, the overall age-adjusted incidence rates of NPC among male and female were estimated at (1.8 and 0.6 Per 100,000 male/female). However, there were no statistically differences in the rates of NPC between the northern region and other provinces in Saudi Arabia, P-Value > 0.05 (Table 6).

	Riyadh						Makkah					
	No of Cases		CIR		Age-adjusted incidence rate		No of Cases		CIR		Age-adjusted incidence rate	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
2013	54	11	2.3	0.5	3.3	0.5	21	9	0.9	0.4	1.2	0.5
2012	33	11	1.4	0.5	2.0	0.6	31	12	1.4	0.5	1.9	0.6
2011	33	16	1.5	0.7	2.2	0.8	29	9	1.4	0.4	1.8	0.5
2010	44	17	2.0	0.8	3.2	1.5	20	6	1.0	0.3	1.3	0.4
2009	28	14	1.3	0.7	2.3	1.2	25	13	1.2	0.7	1.8	0.7
2008	46	16	2.2	0.8	3.4	1.1	26	8	1.3	0.4	2.0	0.6
2007	18	16	0.9	0.8	1.3	1.2	29	12	1.5	0.6	2.2	0.8
2006	19	9	0.9	0.5	1.4	0.6	21	11	1.1	0.6	1.5	0.8
2005	40	9	2.1	0.5	3.4	0.9	28	8	1.5	0.4	2.3	0.6
2004	27	14	1.4	0.8	2.3	1.2	24	7	1.3	0.4	1.8	0.6
2003	28	6	1.5	0.3	2.5	0.8	21	7	1.2	0.4	2.0	0.6
2002	22	8	1.2	0.5	2.7	0.9	16	10	0.9	0.6	1.4	0.9
Overall	32.7	12.3	1.6	0.6	2.5	0.9	24.3	9.3	1.2	0.5	1.8	0.6
Total	392	147					291	112				

Table 6:- The overall CIR and age-adjusted incidence rate of nasopharyngeal carcinoma among male and female Saudis in the region of Riyadh and Makkah, from 2002 to 2013.

The Pattern of Nasopharyngeal Carcinoma in the eastern region of Saudi Arabia:

A total of 213 NPC cases were documented in the eastern region by the SCR from 2002 to 2013. The overall CIRs of NPC among male and female Saudis living in the eastern region from 2002 to 2013 per 100,000 persons, were estimated at (1.0 and 0.3 Per 100,000 male/female). In addition, the overall age-adjusted incidence rates of NPC among male and female were estimated at (1.7 and 0.5 Per 100,000 male/female). However, there were no statistically differences in the rates of NPC between the eastern region and other provinces, except the region of Jouf among female Saudis, the results mentioned in the above results, P-Value < 0.05 (Table 7).

	Eastern Region					
	No of Cases		CIR Per 100,000		Age-adjusted incidence rate Per 100,000	
Region	Male	Female	Male	Female	Male	Female
2013	10	2	0.6	0.1	0.9	0.3
2012	14	4	0.9	0.3	1.7	0.3
2011	21	3	1.4	0.2	2.8	0.3
2010	16	1	1.1	0.1	2.0	0.1
2009	13	1	0.9	0.1	1.1	0.1
2008	14	7	1.0	0.5	1.4	0.8
2007	12	7	0.9	0.5	1.6	0.6
2006	20	4	1.5	0.3	2.2	0.5
2005	11	4	0.8	0.3	1.8	0.5
2004	16	6	1.2	0.5	2.8	1.0
2003	8	5	0.6	0.4	1.2	0.4
2002	10	4	0.8	0.3	1.0	0.5
Overall	13.8	4	1.0	0.3	1.7	0.5
Total	165	48				

Table 7:- The overall CIR and age-adjusted incidence rate of nasopharyngeal carcinoma among male and female Saudis in the Eastern region, from 2002 to 2013.

The overall age specific incidence rate of NPC by gender was calculated from the SCR from 2002 to 2013. Males Saudis aged 60-74 and 45-59 years were most frequently diagnosed with NPC with an estimated overall age specific incidence rates of (18.3 and 14.2 Per 100,000 Male), while females Saudis aged 60-74 and 45-59 years were very similar in the overall age specific incidence rates of NPC with an estimated at (5.9 and 5.2 Per 100,000 Female) (**Table 8**). However, the ratio of male to female was 2:1, while the age-adjusted incidence rates of NPC were significantly higher in Saudi male than in female ($t [310, 285.4] = 8.000$, P-Value < 0.001).

	Age Specific Incidence Rate per 100,000 population															
	No of Cases		0 - 14		15 - 29		30 - 44		45 - 59		60 - 74		≥ 75		All Ages	
Year	Male	Female	M	F	M	F	M	F	M	F	M	F	M	F	M	F
2002	76	41	0.2	0.2	1.2	1.0	5.8	2.7	13.6	6.6	13.9	5.9	1.5	1.0	1.0	0.1
2003	84	39	0.0	0.1	1.1	1.0	5.0	2.7	17.3	3.9	11.6	9.0	1.8	0.0	1.0	0.5
2004	100	45	0.4	0.1	1.2	0.7	5.0	3.0	16.5	6.8	19.2	8.9	4.3	1.1	1.2	0.5
2005	114	32	0.3	0.0	1.2	0.3	6.1	2.5	16.6	3.7	30.1	6.5	3.4	2.1	1.3	0.4
2006	95	43	0.5	0.1	1.9	0.6	4.8	2.0	9.5	5.2	19.9	7.2	7.2	3.4	1.1	0.5
2007	94	58	0.2	0.2	1.4	1.8	4.4	3.3	13.6	5.3	12.1	5.5	2.6	2.6	1.1	0.7
2008	122	45	0.2	0.1	0.7	0.6	6.1	3.0	18.8	4.3	20.4	7.2	3.3	2.5	1.3	0.5
2009	93	42	0.1	0.0	0.5	1.0	5.3	2.1	10.4	5.1	16.8	4.8	5.8	2.5	1.0	0.5
2010	131	40	0.5	0.0	1.9	1.1	6.8	1.9	13.9	2.7	18.9	6.4	4.8	1.6	1.4	0.4
2011	121	45	0.2	0.3	1.1	0.7	5.7	1.0	11.3	7.3	24.3	2.2	6.6	1.7	1.2	0.5
2012	111	45	0.3	0.1	0.5	0.4	1.8	3.0	14.5	5.0	13.8	2.3	4.9	0.0	1.1	0.5
2013	136	47	0.3	0.2	0.9	1.3	6.6	0.3	14.4	5.9	18.1	4.8	4.0	0.8	1.3	0.5
Overall	106	43	0.3	0.1	1.1	0.9	5.3	2.3	14.2	5.2	18.3	5.9	4.2	1.6	1.2	0.5

Table 8:- The overall age specific incidence rate of nasopharyngeal carcinoma among male and female Saudis from 2002 to 2013.

Discussion:-

This is a descriptive epidemiological study of NPC among males and females Saudis from 2002 to 2013. It explores the pattern of NPC in all regions of Saudi Arabia, with focusing on the frequency number of cases, the CIR, and age-adjusted incidence rate stratified by gender, region, and year of diagnosis. The result of the study is based on the data recorded in the SCR from 2002 to 2013.

In this study, we have observed that the highest overall age-adjusted incidence rates of NPC among male Saudis were documented in the region of Qassim from 2002 to 2013. The most likely reason for this rising age-adjusted incidence rate is that most male Saudis living in the region of Qassim were more likely exposed to a specific risk factor that may less appear in other male Saudis living in other provinces of Saudi Arabia. However, two case-control studies should be conducted in the region of Qassim to identify the most important risk factors of NPC among male and female Saudis living in the region of Qassim. **Figure 1**, shows how one can identify the most important risk and protective factors for NPC among male and female Saudis living in the region of Qassim.

We have also observed that the highest overall age-adjusted incidence rates of NPC among female Saudis were documented in the region of Jouf from 2002 to 2013. The most likely reason for this rising age-adjusted incidence rate is that most female Saudis living in the region of Jouf were more likely exposed to a specific risk factor that may less appear in other female Saudis living in other provinces of Saudi Arabia. However, two case-control studies should be conducted in the region of Jouf to identify the most important risk factors of NPC among female and male Saudis living in the region of Jouf. **Figure 2**, shows how one can identify the most important risk and protective factors for NPC among female and male Saudis living in the region of Jouf.

From the above-mentioned result, it is very clear that the region of Jazan had the lowest overall age-adjusted incidence rates of NPC among male and female in Saudi Arabia, from 2002 to 2013. The most likely reason for this decreasing age-adjusted incidence rate is that most male and female Saudis living in the region of Jazan were more likely exposed to a specific protective factor that may does not appear in other male and female Saudis living in other provinces of Saudi Arabia. It means that the male and female Saudis living in the region of Jazan were sharing with each other the same protective factor of NPC. However, two case-control studies should be conducted in the region of Jazan to identify the most important protective factors of NPC among male and female Saudis living in the region of Jazan. **Figure 3**, shows how one can identify the most important risk and protective factors for NPC among male and female Saudis living in the region of Jazan.

Figure 1

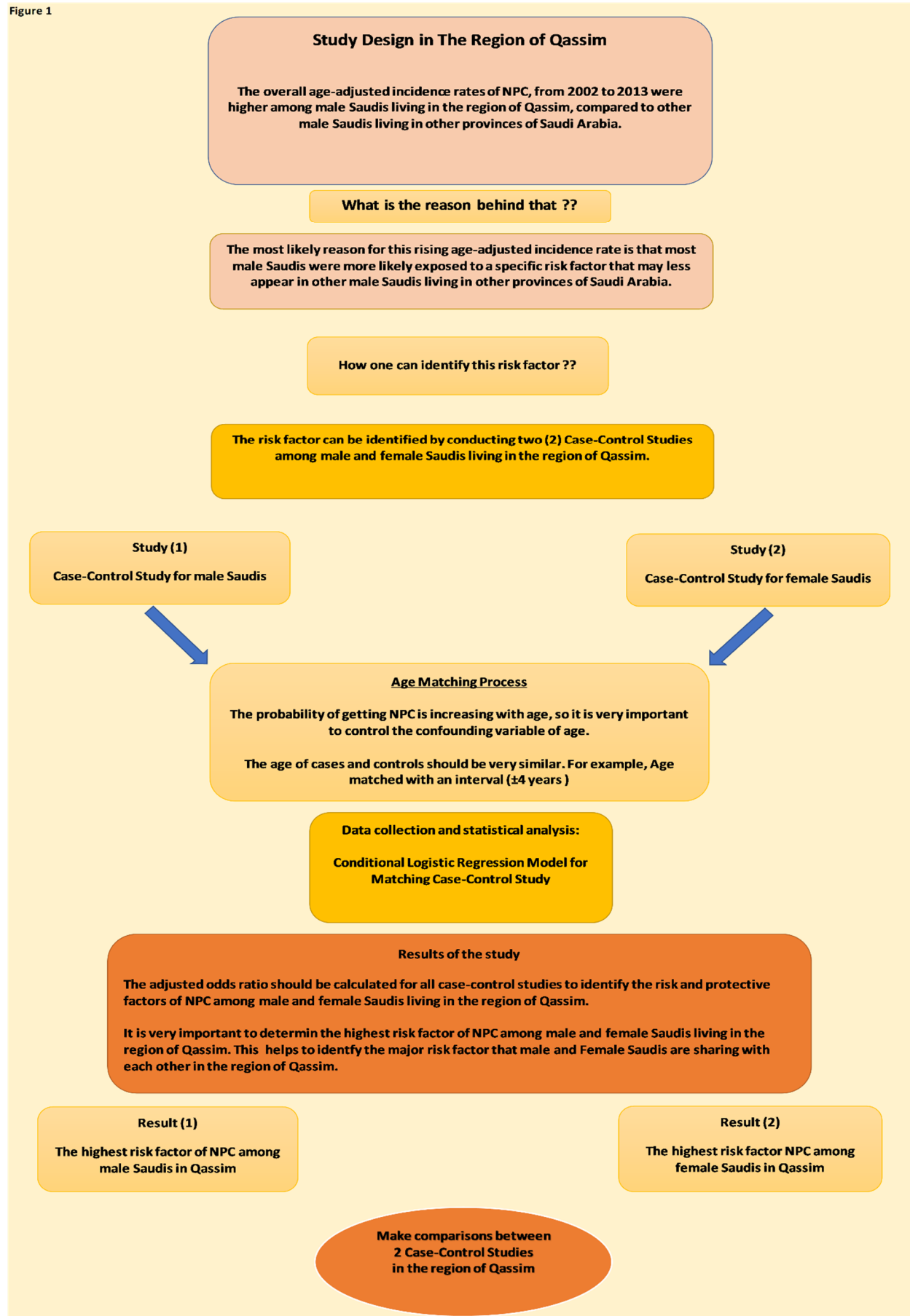


Figure 2

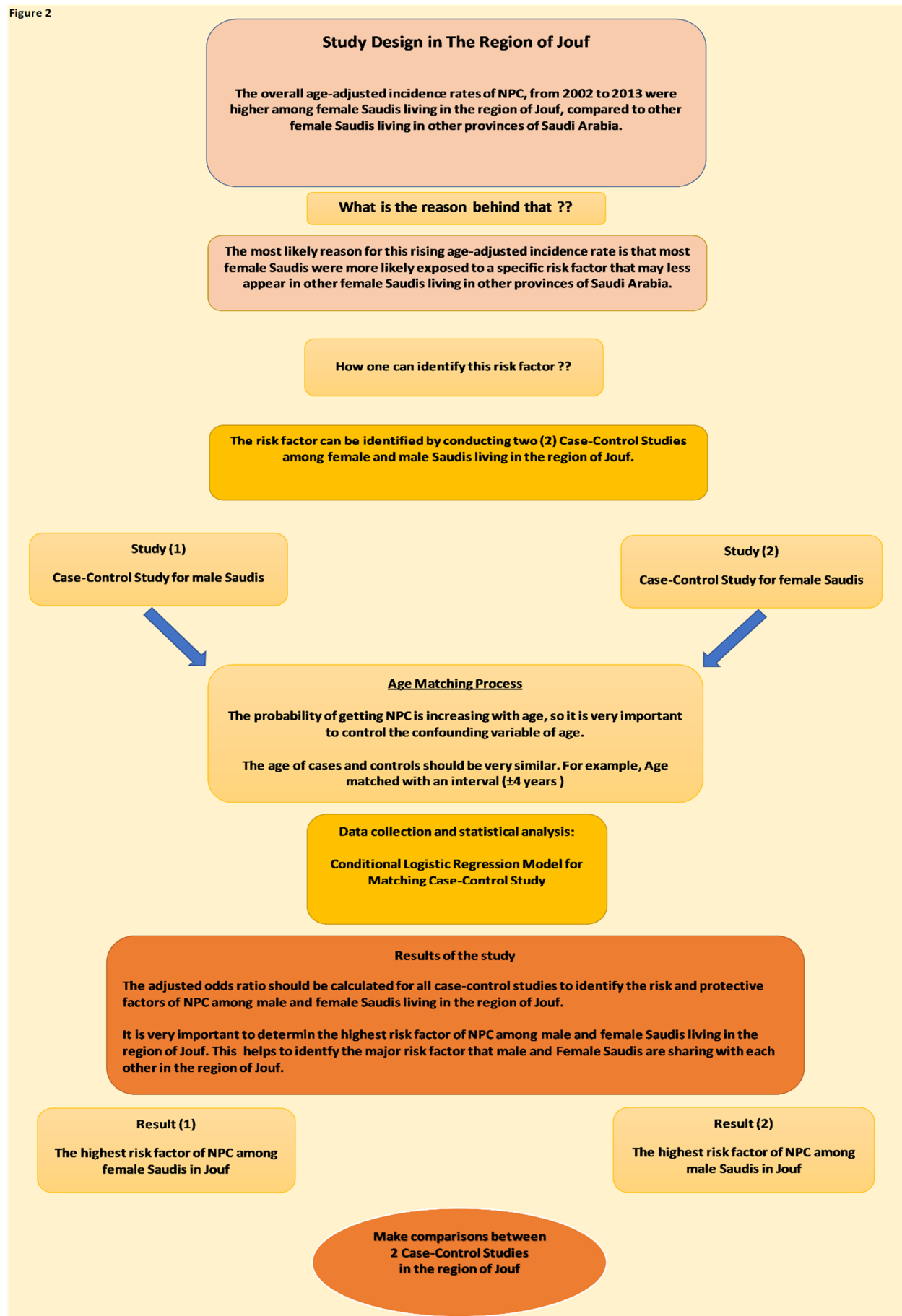
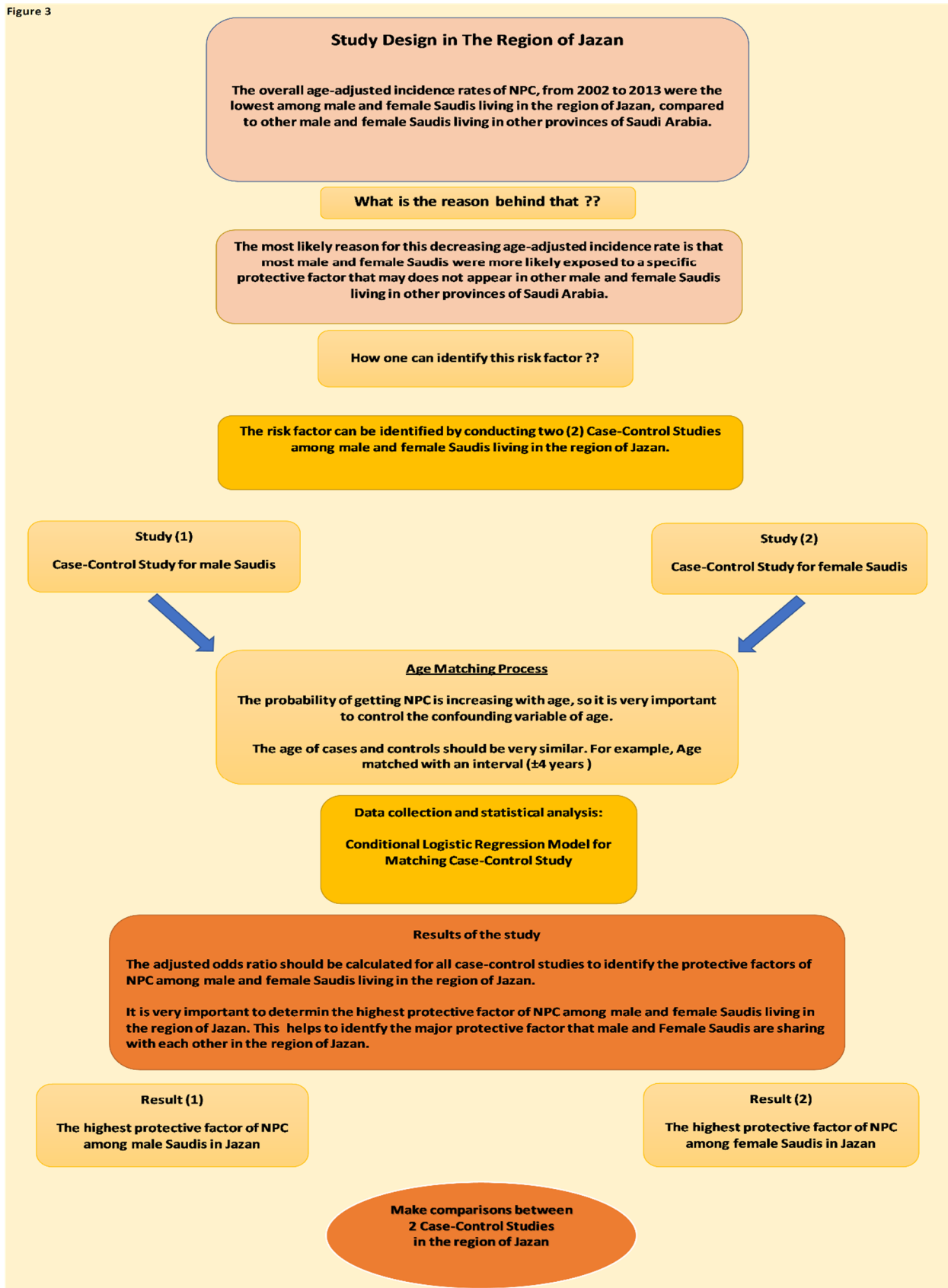


Figure 3



Conclusion:-

Our study revealed that the region Qassim is the best geographic area in Saudi Arabia to study the most important risk factors of NPC among male Saudis. While, the region of Jouf is the best geographic area in Saudi Arabia to study the most important risk factors of NPC among female Saudis. The region of Jazan had the lowest overall age-adjusted incidence rates of NPC among male and female in Saudi Arabia, from 2002 to 2013. Therefore, the secret for confirming the real protective factors of NPC can be found among male and female Saudis living in the region of Jazan. However, multiple case-control studies adjusted by gender and age should be conducted in the above-mentioned regions to identify the major risk and protective factors of NPC.

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