Incidence, risk factors, and management of Bell's Palsy in the Qurayyat region of Saudi Arabia

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Abstract Background. Bell's Palsy is an idiopathic facial nerve dysfunction causing temporary paralysis of muscles of facial expression. This study aimed to determine the incidence, common risk factors, and preferred treatment by the Saudi patients with Bell's Palsy. **Method.** This cross-sectional study was carried out in the Qurayyat region of Saudi Arabia. The retrospective medical records were searched from 2015-2020 of patients diagnosed with Bell's Palsy at Qurayyat General Hospital and King Fahad hospital. A 28-item questionnaire was developed by a team of experts and pre-tested among patients with Bell's Palsy before being sent to the eligible participants. The data was analyzed using summary statistics, Chi-square test, Fisher exact test and Likelihood ratio test. **Results.** We identified 279 cases of Bell's Palsy from the medical records of the hospitals from the years 2015 to 2020, accounting for 46.5 cases per year and an incidence of 25.7 per 100,000 per year. Out of 279 patients with Bell's Palsy, only 171 returned the questionnaire accounting for a response rate of 61.2%. Out of 171 patients with Bell's Palsy, females (n=147, 86.0%) accounted for the majority of cases. The most affected age group among participants with Bell's Palsy was 21–30 years (n = 76, 44.4%). There were 153 (89.5%) cases who reported Bell's Palsy for the first time. The majority of the participants experienced right-sided facial paralysis (n = 96, 56.1%). Likelihood ratio test revealed significant relationship between exposure to cold air and common cold with age groups ($\chi2(6, N = 171) = 14.926$, $P = 0.021$), $\chi2(6, N = 171) = 16.354$, $P= 0.012$ respectively. The post hoc analyses revealed that participants in the age group of 20-31-years were mostly affected due to exposure to cold air and common cold than the other age groups. The main therapeutic approach preferred was physiotherapy (n=149, 87.1 %), followed by corticosteroids and antivirals medications (n=61, 35.7%), acupressure (n=35, 20.5%), traditional Saudi herb medicine (n=32, 18.7%), cauterization by hot iron rod

(n=23, 13.5%), supplementary therapy (n=2, 1.2%), facial cosmetic surgery (n=1, 0.6%) and no treatment (n=1, 0.6%). The most preferred combined therapy was physiotherapy (87.6%) with corticosteroid and antiviral drugs (35.9%), and acupressure (17.6%).
Conclusion. The rate of Bell's Palsy was approximately 25.7 per 100,000 per year in the Qurayyat region of Saudi Arabia. Exposure to cold air and common cold were the significant risk factors associated with Bell's Palsy. Females were predominantly affected by Bell's Palsy in the Qurayyat region of Saudi Arabia. Bell's Palsy most commonly occurred in the age group 21-30 years . The most favored treatment was physiotherapy following Bell's Palsy.

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Abstract

Background. Bell's Palsy is an idiopathic facial nerve dysfunction causing temporary paralysis of muscles of facial expression. This study aimed to determine the incidence, common risk factors, and preferred treatment by the Saudi patients with Bell's Palsy.

Method. This cross-sectional study was carried out in the Qurayyat region of Saudi Arabia. The retrospective medical records were searched from 2015-2020 of patients diagnosed with Bell's Palsy at Qurayyat General Hospital and King Fahad hospital. A 28-item questionnaire was developed by a team of experts and pre-tested among patients with Bell's Palsy before being sent to the eligible participants. The data was analyzed using summary statistics, Chi-square test, Fisher exact test and Likelihood ratio test.

Results. We identified 279 cases of Bell's Palsy from the medical records of the hospitals from the years 2015 to 2020, accounting for 46.5 cases per year and an incidence of 25.7 per 100,000 per year. Out of 279 patients with Bell's Palsy, only 171 returned the questionnaire accounting for a response rate of 61.2%. Out of 171 patients with Bell's Palsy, females (n=147, 86.0%) accounted for the majority of cases. The most affected age group among participants with Bell's Palsy was 21–30 years (n = 76, 44.4%). There were 153 (89.5%) cases who reported Bell's Palsy for the first time. The majority of the participants experienced right-sided facial paralysis (n = 96, 56.1%). Likelihood ratio test revealed significant relationship between exposure to cold air and common cold with age groups ($\chi 2(6, N = 171) = 14.926$, $P = 0.021$), $\chi 2(6, N = 171) = 16.354$, $P= 0.012$ respectively. The post hoc analyses revealed that participants in the age group of 20-31-years were mostly affected due to exposure to cold air and common cold than the other age groups.

The main therapeutic approach preferred was physiotherapy (n=149, 87.1 %), followed by corticosteroids and antivirals medications (n=61, 35.7%), acupressure (n=35, 20.5%), traditional Saudi herb medicine (n=32, 18.7%), cauterization by hot iron rod (n=23, 13.5%), supplementary therapy (n=2, 1.2%), facial cosmetic surgery (n=1, 0.6%) and no treatment (n=1, 0.6%). The most preferred combined therapy was physiotherapy (87.6%) with corticosteroid and antiviral drugs (35.9%), and acupressure (17.6%).

Conclusion. The rate of Bell's Palsy was approximately 25.7 per 100,000 per year in the Qurayyat region of Saudi Arabia. Exposure to cold air and common cold were the significant risk factors associated with Bell's Palsy. Females were predominantly affected by Bell's Palsy in the Qurayyat region of Saudi Arabia. Bell's Palsy most commonly occurred in the age group 21-30 years. The most favored treatment was physiotherapy following Bell's Palsy.

Keywords: Bell's Palsy; Facial Palsy; risk factors; physiotherapy; cross sectional survey; incidence; prevalence.

Introduction

Bell's Palsy is a common lower motor nerve paralysis of facial nerve of unknown origin (Eviston et al.). The patient with Bell's Palsy experiences sudden unilateral flaccid paralysis of muscles of facial expression, rarely bilateral (Gilden). The patient is unable to perform facial movements on the affected side and facial asymmetry becomes clear with attempted facial movements (Reich). The annual incidence (1992-1996) has been reported 20.2 per 100,000 populations as per the UK General Practice Research database (Rowlands et al.). Research studies globally report variation in annual incidence (11-50 cases per 100,000) of Bell's Palsy (Monini et al.; JI et al.; Hsieh et al.; Kokotis and Katsavos; Yilmaz et al.). The national prevalence of Bell's Palsy in Saudi Arabia is unknown, however, regional incidence/prevalence was reported in a few studies such as 5.35 per 100,000 per year (1992-1995) incidence in the Asir region (Al Ghamdi), 30.4% cases of Bell's Palsy per 100,000 per year (1995-1997) in the Qassim region (Hamid), 26.3-27.8 % cases per 100,000 per year (2011-2012) in the Aljouf region (Jamil et al.), and 26.3 % cases per 100,000 per year (2016-2017) in the Arar region (Alanazi et al.).

The cause of Bell's Palsy is idiopathic; however many possible causes have been recognized such as reactivation of the herpes simplex virus, human immunodeficiency virus, and hepatitis C virus(Greco et al.). Additionally, there are several risk factors associated with Bell's Palsy such as age, pregnancy, epilepsy, obesity, hypertension, diabetes, respiratory tract infection, vaccination (Colella et al.) (Potterton), and genetic susceptibility due to consanguineous marriages in Saudi Arabia (Middle et al.). A recent increase in the prevalence of diabetes (Elhadd et al.), hypertension (Al-Nozha, Abdullah, et al.), and obesity (Al-Nozha, Al-Mazrou, et al.) in Saudi Arabia increase the risk of Bell's Palsy. Moreover, a customary practice of consanguineous marriages increases the risk of autosomal recessive genetic disorders (AbdulAzeez et al.). Therefore, a study is needed to explore the possible impact of increased risk factors and consanguineous marriage on the incidence of Bell's palsy in Saudi population.

A standard recommended treatment of Bell's Palsy includes oral corticosteroids and limited evidence about the additive benefit of antiviral drugs for 10-12 days (Allen and Dunn; Salinas et al.; Engström et al.; Heckmann et al.) , additionally, physiotherapy modalities (Gatidou et al.), acupuncture (Bae), dry needling (Zhang et al.), taping (Ghous et al.), and neural mobilization technique (Kashoo et al.) has been reported to be beneficial. However, the traditional method to treat Bell's Palsy in Saudi Arabia is still in practice. Some of the common traditional methods for general pain management is using herbs (Shaikh) and cauterization (Aboushanab and AlSanad). Cauterization for Bell's Palsy is performed by placing a hot iron rod at the back of the neck region or between the thumb and index finger (Alsanad et al.). Such traditional methods may result in severe burn injuries and sometimes develop into complicated wounds in cases with pre-existing conditions such as diabetes (Qureshi et al.).

There is limited literature about the contribution of risk factors and treatment preferred by the Saudi population following diagnosis of Bell's Palsy. Therefore, the aim of this study is to determine the incidence, possible risk factors, and preferred treatment options following Bell's palsy in the Saudi population.

Materials & Methods

Study design and settings: The study is a retrospective cross-sectional hospital-based study. The study was carried out in the department of physiotherapy at the Qurayyat General Hospital and King Fahad hospital. Ethical approval was obtained from the ethical committee of the hospitals in December 2020 prior to the commencement of the study(QGH-EC-16-2020).

The files and medical records of patients diagnosed with Bell's Palsy were reviewed in Qurayyat General Hospital and King Fahad Hospital. Two hundred seventy-nine patients from the years 2015 to 2020 (inclusive) were identified and contacted through email and telephone for participation. Where the patient was a minor, parents were contacted for consent (Figure 1). The subjects were included in the study if they were diagnosed with Bell's Palsy by a qualified medical doctor. One subject who was recruited through community advertisement was assessed by a neurologist at the Qurayyat general hospital.

Study Method: The retrospective medical records of two major hospitals (Qurayyat General hospital and King Fahad hospital) were searched for patients diagnosed with Bell's Palsy. The eligible patients were communicated through SMS, telephone, and email. The advertisement to participate in the study was made across the hospital and in community centers such as shopping centers in the form of pamphlets. All eligible participants were invited to participate in the study. Those who consented were requested to fill out an online questionnaire consisting of 28 questions. Non-respondents were contacted again after an interval of two weeks for a maximum of four times till all communications were stopped.

Questionnaire

A group of experts consisted of four clinicians (two neurologists, two general physicians) and four academic university staff (one associate professor in physiotherapy, one language expert, two professors in medical college) with an average experience of more than 10 years. A preliminary set of questions were submitted by the authors of this study to the expert committee.

The preliminary sets of questions were emailed to every member of the expert committee before the meeting. The expert committee conducted two meetings before finalizing a set of 28-questions (Appendix 1).

The questionnaire was pre-tested among 10 Bell's Palsy patients visiting Qurayyat general hospital for clarity. Any question that was indicated unclear by patients was rephrased by the expert committee until all expert members approved the changes.

The final version of the questionnaire was piloted among 30 patients with Bell's Palsy visiting Qurayyat general hospital and King Fahad hospital. The internal consistency of the 28 item questionnaire was 0.716 calculated by Cronbach's alpha.

Sample size calculation

The target population was Bell's Palsy patients in the Qurayyat region of Saudi Arabia. For sample size calculation, the sample size from reviewing medical records was 279. To achieve a 95% Confidence interval with a 5% margin of error and 50% response distribution, the current study required 162 Bell's Palsy patients to represent the population (http://www.raosoft.com/samplesize.html). Out of 279 eligible participants, 171 participants with Bell's Palsy responded to the questionnaire accounting for a 61.2% response rate.

Statistical Analysis

The information and data from the study were entered into an electronic database (SPSS® for windows®V.20). The demographic data were analyzed through frequency distribution and the relation between various risk factors was analyzed by chi-square test, Fishers Exact test and Likelihood Ratio test. The total population of the Qurayyat region of Saudi Arabia in the year 2020 was 180,430 (MOH). The incidence rate was calculated as number of new Bell's Palsy would appear annually for 100,000 people in a population. Incidence was calculated by the formula below.

*Incidence = Total number of cases identified (n=279) /Total population at Qurayyat region (n=180,430) * 100,000 = 154.6 / 6 years (2015-2020) =25.7 per 100,000 per year.*

Results

Among 171 Bell's palsy patients, the majority of participants were female (n = 147, 86%). Bell's Palsy was common among the 21-30-year age group (n=76,44.4%) and lowest among 1-10 years (n=11,6.4%). The highest number of participants reporting Bell's Palsy for the first time was (n=129, 75.45%) and recurrent Bell's Palsy reported was (n=18, 10.5%). There were n=21 (12.3%) participants vaccinated before experiencing Bell's Palsy. (Table 1).

There was a significant number of participants (n=135,78.9%) exposed to cold air before experiencing Bell's Palsy. A Likelihood Ratio Test was performed to examine the relation between age groups and exposed to cold air before experiencing Bell's Palsy. The relationship between these variables was significant, $\chi 2$ (5, N = 171) = 14.926, P = 0.011. The post hoc analysis with Bonferroni correction and adjusted P-value of 0.0072 to be significant at the $P<0.05$ level, revealed 21-30 year age group was significantly affected. Sixty-five (38%) participants reported that their parents were cousins and n=20 (11.7%) reported having a familial-related genetic disorder. There was no significant relationship between the

consanguinity with gender, onset and reoccurrence of Bell's Palsy but consanguinity showed significant relationship with side affected and age group, $\chi 2$ (2, N = 171) = 12.090, P = 0.002, $\chi 2$ (5, N = 171) = 13.025, P = 0.023 respectively,

The main therapeutic approach preferred was physiotherapy (n=149, 87.1 %), followed by corticosteroids and antivirals drugs (n=61, 35.7%), acupressure (n=35, 20.5%), traditional Saudi herb medicine (n=32, 18.7%), cauterization by hot iron rod (n=23, 13.5%), supplementary therapy (vitamins and neuro-vitality drugs (n=2, 1.2%), facial cosmetic surgery (n=1,0.6%) and no treatment (n=1,0.6%). The most preferred combination therapy was physiotherapy (87.6%) with corticosteroid and antiviral drugs (35.9%), and acupressure (17.6%) (Table 2)

There were relatively less number of participants suffering from ear infection (n=28, 16.4%), diabetes (n=23,13.5%), genetic disease (n=20, 11.7%), high blood pressure (n=18, 10.5%), neurological disorder (n=16, 9.4%), head injury (n=11, 6.4%), balance problem (n=10, 5.8%) stroke (n=3, 1.8%), and heart disease (n=3, 1.8%) (Figure 2).

Discussion

This study aimed to determine the incidence, risk factors and preferred treatment among participants with Bell's Palsy residing in the Qurayyat region of Saudi Arabia. According to this study, the females were predominantly affected and a significant number of participants opted for complementary and traditional therapy rather than research-recommended corticosteroid and antiviral drug therapy.

The average incidence of Bell's Palsy was found to be 25.7 cases per 100,000 per year in the Qurayyat region of Saudi Arabia. The most affected age group was 21-30 years with females 6.12 times more affected than males. Physiotherapy and standard drug therapy (corticosteroid and antiviral drugs) are preferred over the other modes of treatment. A study conducted in the Arar region of Saudi Arabia found 26.3% of cases of Bell's Palsy with females (61%) more affected than males (Alanazi et al.). The authors also report that participants preferred physiotherapy treatment over drug therapy (Alanazi et al.).

Seventy-five percent of the participants with Bell's Palsy experienced sudden facial muscle paralysis. The majority of the participants experienced first-time facial paralysis with 10.5% reporting recurrent Bell's Palsy. Similarly, a study conducted in the Asir region of Saudi Arabia also found that the majority of participants reported sudden onset Bell's Palsy in winter. The author also reported 5.35 per 100,000 per year incidence of Bell's Palsy (Al Ghamdi). On the contrary, the incidence of Bell's Palsy in our study was approximately 25.7 per 100,000 per year. The incidence was calculated from the total population of the Qurayyat region, which was 180,430 as per the 2020 population census of the Ministry of Health Saudi Arabia (Ministry of Health Saudi Arabia).

In our study, we found only 12.3% of participants reporting Bell's Palsy after the COVID-19 vaccination. Similarly, a research study about the association of Bell's Palsy with COVID-19 vaccination is scarce and few case reports have been presented but the incidence of Bell's Palsy after vaccination is low. Studies are reporting a significant association between vaccination and incidence of Bell's Palsy (Cirillo and Doan), however, the studies might have introduced

selection bias as selected age groups were vaccinated because the incidence of Bell's Palsy greatly varies with age (Li et al.). In our study, we found that 78.9% of participants reported Bell's Palsy after they were exposed to cold air. However, only 28.7% and 19.3% of participants reported catching a common cold and flu before suffering from Bell's Palsy. A study conducted among 1,181 active duty military service members in the USA reported 33% more incidence of Bell's Palsy in cold climate than in warm regions (Campbell and Brundage).

Pre-existing conditions such as diabetes, middle ear infection, head injury, high blood pressure, head and neck surgery, stroke, genetic disease, neurological disorders, respiratory disease were reported by a small number of participants with Bell's Palsy. A case-control study conducted in Italy among 381 cases reported no significant difference due to the presence of hypertension or diabetes. However, the chances of Bell's Palsy increased linearly every year by 2% with age (Monini et al.).

Research has reported that allopathic drug therapy to be recommended following Bell's Palsy (de Almeida et al.). The use of corticosteroids is recommended to avoid unsatisfactory patient outcomes and the addition of antiviral drugs therapy has additive benefits (De Almeida et al.). However, in our study, 64.3% of participants reported not taking recommended drugs. A review study by (Potterton) recommended using corticosteroids therapy within 72 hours of the onset of Bell's Palsy for a better outcome. Physiotherapy and allopathic drug therapy for 3-4 weeks following Bell's Palsy among participants were the favored treatment choice following Bell's Palsy. Complementary therapy such as acupressure in the form of dry needling was reported by 20.5% of participants. A study conducted among the general population (n-=420) found only 49.6 % favored steroid treatment while 54.7% favored traditional medicine (AlYahya et al.). A study conducted among dental students (n=654) reported only 39% of dental students favored corticosteroid therapy (Al Meslet et al.).

Traditional Saudi medicine and cauterization (hot iron rod) were used by 18.7% and 13.5% of participants respectively. This traditional medicine is reported to cause severe burn injury and complicated wounds (Aboushanab and AlSanad).

Limitations

The study is a regional study and the number of participants was relatively small. The recall bias might have occurred because the study involved the participant's memory to remember the events from the past. The Qurayyat region of Saudi Arabia is relatively smaller than the other 13 major provinces of Saudi Arabia. Therefore, the results cannot be generalized to the whole nation. The actual number of patients with Bell's Palsy in the Qurayyat region of Saudi Arabia could not be determined because some patients might not visit a hospital or choose traditional medicine. Such limitation was reduced in our study by regular public advertisement through pamphlets and announcements in public places.

Clinical Implications

The general public can be educated about the best treatment available for Bell's Palsy to avoid solely relying on traditional medicine. The Bell's Palsy is mostly occurring during winter season,

therefore hospitals and clinics must equip themselves with sufficient medications and medical doctors for better patient outcome.

Conclusions

The incidence of Bell's Palsy was approximately 25.7 per 100,000 per year in the Qurayyat region of Saudi Arabia. Exposure to cold air and influenza were significant risk factors associated with Bell's Palsy. Females were predominantly affected by Bell's Palsy in the Qurayyat region of Saudi Arabia. Bell's Palsy most commonly occurred in the age group 21-30 years. The most favored treatment was physiotherapy following Bell's Palsy. The population in Qurayyat region of Saudi Arabia needs to be educated about the potential benefits of combination therapy for improved patient outcomes rather than relying upon complementary or traditional medicine alone.

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Table 1(on next page)

Demographic data of Patients with Bell's Plasy

Variables	Number (n=171)	Percentage (%)	Between Variables	*P*
Gender				
Male	24	14		
Female	147	86		
Age Group (years)				
1-10	11	6.4	Gender*Age Group	(2.564378)* 0.851795
11-20	32	18.7		
21-30	76	44.4		
31-40	16	9.4		
41-50	20	11.7		
51-60above	14	8.2		
Side Affected				
Right	96	56.1	Gender*Side Affected	(0.618661)** 0.734718
Left	63	36.8		
Bilateral	12	7		
Onset				
Sudden	129	75.4	Age Group*Onset	(79.244618) * 0.160179
Gradual	42	24.6		
Recurrence				
Firsrist time	153	89.5	Age Group*Recurrence	(318.739053) * 0.152120
Second timetime or more	4	2.3		
Treatment following Bell's Palsy				
Physical Therapy	149	87.1	Age Group*treatment	(341.952) *** 0.001(14.29) * 0.27
Traditional	32	18.7		
Drugs	61	35.7		
Acupressure	35	20.5		
Hot Iron	23	13.5		
Others	4	2.3		
COVID-19 Vaccination	150	87.7		
Before vaccination				
After vaccination	21	12.3		

Note: * Likelihood ratio, **Pearson's Chi-Square, ***Related Samples Cochran's Q Test

Table 2(on next page)

Multiple response on preferred treatment by patients with Bell's Palsy

1

2

Preferred treatment	Physical therapy	Hot iron	Allopathic drugs	no treatment	Acupressure	Cosmetic surgery	Supplements	Hot Iron	Mutually inclusive responses
	N	N	N	N	N	N	N	N	
Physical therapy	149	22	57	0	30	1	2	15	429
Allopathic drugs	57	9	61	0	15	0	0	6	231
Hot iron	22	32	9	0	5	0	1	5	114
No treatment	0	0	0	1	1	0	0	0	3
Acupressure	30	5	15	1	35	1	0	6	144
Cosmetic surgery	1	0	0	0	1	1	0	0	5
Supplements	2	1	0	0	0	0	2	0	8
Hot Iron	15	5	6	0	6	0	0	23	74
Total	149	32	61	1	35	1	2	23	468

3 N=number of responses from patients with Bell's Palsy, %, percentage of responses

Figure 1

Flow diagram of recruitment of participants

Figure 1: Flow Diagram

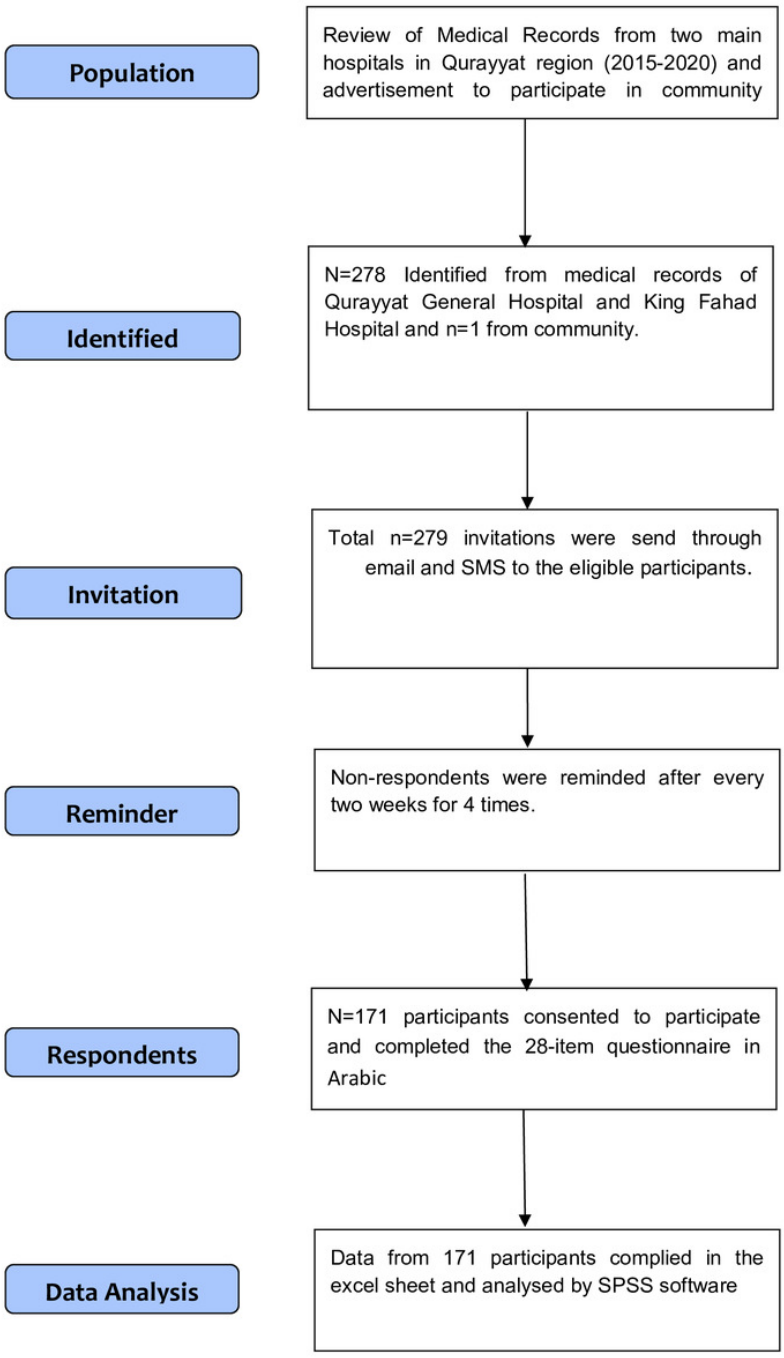
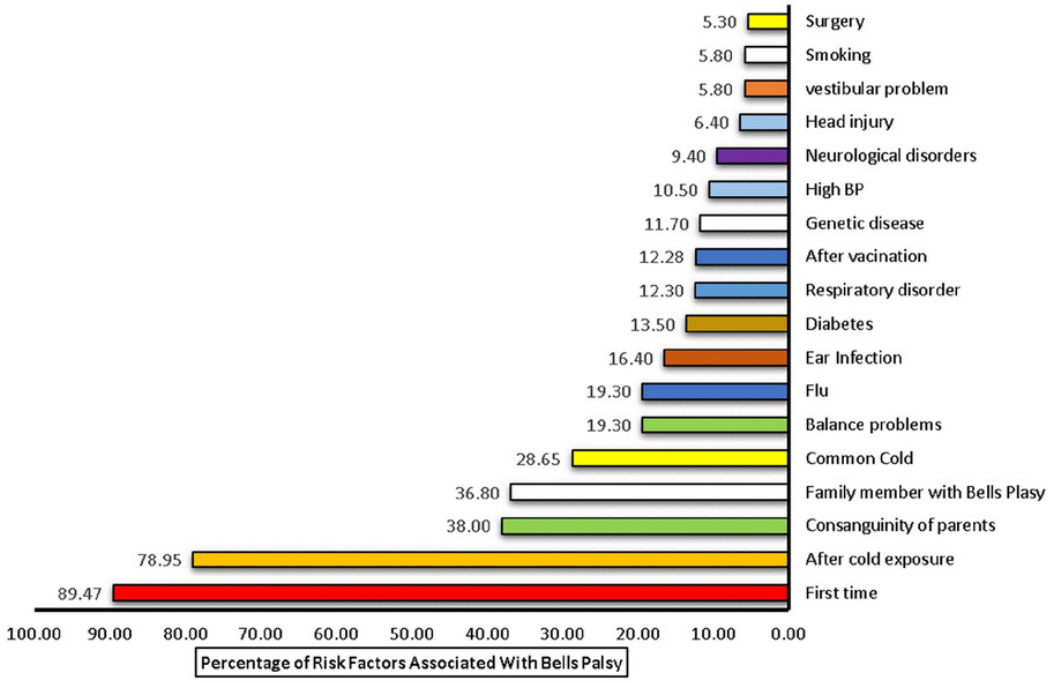


Figure 2

Percentage of risk factors associated with Bell's Palsy in Patients at Qurayyat region of Saudi Arabia.


5.30 Surgery
5.80 Smoking
5.80 vestibular problem
6.40 Head injury
9.40 Neurological disorders
10.50 High BP
11.70 Genetic disease
12.28 After vacination
12.30 Respiratory disorder
13.50 Diabetes
16.40 Ear Infection
19.30 Flu
19.30 Balance problems
28.65 Common Cold
36.80 Family member with Bells Plasy
38.00 Consanguinity of parents
78.95 After cold exposure
89.47 First time
100.00 90.00 80.00 70.00 60.00 50.00 40.00 30.00 20.00 10.00 0.00
Percentage of Risk Factors Associated With Bells Palsy