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

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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 health providers population 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, pre-tested, and piloted among bell's palsy patients before sending it to the eligible participants. 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. Females (n=141, 86%) ~~were predominantly affected than~~acounted for the majority of cases ~~males~~. The most affected age group was 21-30 years (n=76,44.4%). There were 157 (89.5%) cases affected who reported Bell's palsy for the first time. Majority of the participants reported right-sided facial paralysis (n=96, 56.1%) and only (n=12,7.0%) had bilateral facial paralysis. Chi-square analysis revealed significant relation between exposing to cold air and common cold with age groups (X2(6, N = 171) = 14.926, ~~p~~ P = 0.021), X2(6, N = 171) = 16.354, ~~p~~ P = 0.012, respectively. The post -hoc analysis revealed that participants in the age group of 20-31-year 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 ~~drugs~~ 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 (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

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was physiotherapy (87.6%) with corticosteroid and antiviral drugs (35.9%), and acupressure (17.6%). **Conclusion.** The ~~incidence~~ rate of Bell's ~~palsy~~ Palsy was approximately 25.7 per 100,000 per year in the Qurayyat region of Saudi Arabia. Exposure to cold air and common cold ~~was~~ were the significant risk factors associated with Bell's ~~palsy~~Palsy. Females were predominantly affected by Bell's ~~palsy~~ Palsy in the Qurayyat region of Saudi Arabia. A peak incidence was seen in the age group 21-30 years. The most favored treatment was physical therapy following ~~bell's~~ Bell's P~~p~~alsy.

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Abstract

Background. Bell's palsy is an idiopathic facial nerve dysfunction causing paralysis of muscles of facial expression. This study aimed to determine the incidence, common risk factors, and preferred treatment by the Saudi population 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, pre-tested, and piloted among bell's palsy patients before sending it to the eligible participants.

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. Females (n=141, 86%) were predominantly affected than males. The most affected age group was 21-30 years (n=76,44.4%). There were 157 (89.5%) cases affected who reported Bell's palsy for the first time. Majority of the participants reported right-sided facial paralysis (n=96, 56.1%) and only (n=12,7.0%) had bilateral facial paralysis.

Chi-square analysis revealed significant relation between exposing to cold air and common cold with age groups ($X2(6, N = 171) = 14.926$, $p = 0.021$), $X2(6, N = 171) = 16.354$, $p = 0.012$ respectively. The post hoc analysis revealed that participants in the age group of 20-31-year 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 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

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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%).

Conclusion. 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 common cold was the significant risk factors associated with Bell's palsy. Females were predominantly affected by Bell's palsy in the Qurayyat region of Saudi Arabia. A peak incidence was seen in the age group 21-30 years. The most favored treatment was physical therapy following bell's palsy.

Introduction

Bell's ~~palsy~~ Palsy is a common lower motor nerve paralysis of facial nerve of unknown origin. The patient with Bell's Palsy experiences sudden unilateral flaccid paralysis of muscles of facial expression, rarely bilateral. The patient is unable to perform facial movements towards the affected side and facial asymmetry becomes clear with attempted facial movements.

The annual incidence ~~is~~ has been reported 15-30 per 100,000 populations as per the data from National Health Survey, UK. Being a relatively rare condition, the annual incidence of Bell's palsy is reported to be 11-40 cases per 100,000 populations. 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 [1], 30.4% cases of Bell's palsy per 100,000 per year (1995-1997) in the Qassim region [2], 26.3-27.8 % cases per 100,000 per year (2011-2012) in the Aljouf region [3], and 26.3 % cases per 100,000 per year (2016-2017) in the Arar region [4].

The cause of Bell's palsy is ~~unknown~~idiopathic; ~~but~~ however many probable causes have been recognized such as reactivation of the herpes simplex virus, human immunodeficiency virus, and hepatitis B virus[5]. Additionally, there are several risk factors associated with Bell's palsy such as age, pregnancy, epilepsy, obesity, hypertension, diabetes, respiratory tract infection, vaccination [6,7], and genetic susceptibility due to consanguineous marriages in Saudi Arabia [8]. A recent increase in the prevalence of diabetes [9], hypertension [10], and obesity [11] in Saudi Arabia increases the risk of developing many neurological disorders including Bell's ~~palsy~~Palsy. Moreover, a customary practice of consanguineous marriages increases the risk of autosomal recessive genetic disorders [12]. Therefore, a research study is needed to explore the impact of increased prevalence of risk factors and consanguineous marriage on the prevalence and incidence of Bell's palsy in Saudi Arabia.

A standard, recommended treatment of Bell's Palsy includes oral corticosteroids and antiviral drugs for 12 days ~~(about 1 week 5 days)~~[13], additionally, physical therapy modalities [14], acupuncture [15], dry needling [16], taping [17], and neural mobilization technique [18] ~~is~~ has been reported to be beneficial. However, the traditional method to treat Bell's Palsy in Saudi Arabia is still in practice. One of the common traditional methods is using herbs [19] and cauterization [20]. 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 [21]. Such traditional methods may result in severe burn injuries and sometimes develop~~s~~ into complicated wounds in cases with pre-existing conditions such as diabetes [22].

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~~Little~~ ~~There is limited literature~~~~has been published~~ about the contribution of risk factors and treatment preferred by the Saudi population following Bell's palsy. Therefore, the study ~~aims~~ aimed to determine the incidence, association of risk factors, and preferred treatment options following Bell's palsy in the Saudi population.

Materials & Methods

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. Prior ethical approval was obtained from the ethical committee of the hospitals in December 2020 ~~before~~ 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 ~~91~~ 2015 to 2020 (inclusive) were identified and contacted through email and telephone for participation. ~~In~~ ~~92~~91 ~~case the~~Where the patient ~~is~~ was a minor, parents were contacted for consent (Figure 1). The subjects were ~~93~~92 included in the study if they were diagnosed with Bell's palsy by a qualified medical doctor. One ~~94~~93 subject who was recruited through community advertisement was assessed by a neurologist at ~~95~~94 the Qurayyat general hospital.

~~96~~95 Study Method: The retrospective medical records of two major hospitals (Qurayyat General ~~97~~96 hospital and King Fahad hospital) were searched for patients diagnosed with Bell's palsy. The ~~98~~97 eligible patients were communicated through SMS, telephone, and email. The advertisement to ~~99~~98 participate in the study was made across the hospital and in community centers such as shopping ~~100~~99 centers in the form of pamphlets. All eligible participants were invited to participate in the study.

~~101~~100 Those who consented were requested to fill out an online questionnaire consisting of 28 ~~102~~101 questions. Non-respondents were contacted again after an interval of ~~2~~ two weeks for ~~4~~ a maximum of four times till all ~~103~~102 communications were stopped.

~~104~~103 Questionnaire

~~105~~104 A group of experts consisting of ~~4~~ four clinicians (two neurologists, ~~2~~ two general physicians) and ~~4~~four ~~106~~105 academic university staff (one associate professor in physiotherapy, one language expert, two ~~107~~106 professors in medical college) with an average experience of more than 10 years. A preliminary ~~108~~107 set of questions were submitted by the authors of this study to the expert committee. The ~~109~~108 preliminary sets of questions were emailed to every member of the expert committee before the ~~110~~109 meeting. The expert committee conducted two meetings before finalizing a set of 28-questions ~~111~~110 (Appendix 1).

~~112~~111 The questionnaire was pre-tested among 10 Bell's palsy patients visiting Qurayyat general ~~113~~112 hospital for clarity. Any question that was indicated unclear by patients was rephrased by the ~~114~~113 expert committee until all expert members approved the changes.

~~115~~114 The final version of the questionnaire was piloted among 30 patients with Bell's palsy visiting ~~116~~115 Qurayyat general hospital and King Fahad hospital. The internal consistency of the 28 item ~~117~~116 questionnaire was 0.716 calculated by Cronbach's alpha.

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~~118~~117 Sample size calculation

The target population was Bell's palsy patients in the Qurayyat region of Saudi Arabia. For sample size calculation, the population from the reviewing the medical records were 279. To achieve a 95% ~~Confidence~~ confidence interval with a 5% margin of error and 50% response distribution, the current study required 162 Bell's palsy patients to participate 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. The incidence was calculated from the total number of Bell's palsy per 100,000 populations annually in the Qurayyat region of Saudi Arabia. The total population of the Qurayyat region of Saudi Arabia in the year 2020 was 180,430 [23]. The incidence rate was calculated by dividing the number of patients with bell's palsy annually by the total population in the Qurayyat region of Saudi Arabia. The value obtained from the incidence was multiplied by 100,000 to ~~get~~ determine the incidence.

The questionnaire was analyzed for internal consistency by Cronbach alpha and ~~I~~ inter-~~Class~~class correlation coefficient (ICC).

Results

~~The~~ The study consists of a majority of female participants (n=147, 86%) out of 171 total ~~sample sizes~~participants. The highest prevalence of Bell's palsy was 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 which was significantly related to age groups $X^2(6, N = 171) = 14.926$, $p = 0.021$. 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 age group was significantly affected.

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).

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There was no significant relationship between the incidence of Bell's palsy and consanguinity. Only sixty-five (38%) participants reported that their parents were cousins and only n=20 (11.7%) reported having a familial-related genetic disorder.

Discussion

The study aimed to identify the risk factors and preferred treatment after Bell's palsy among participants 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. Physical therapy 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 [4]. The authors also report that participants preferred physiotherapy treatment over drug therapy [4].

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 [1]. 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 [24].

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 scary 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 [25], 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 [26]. 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 [27].

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 [28].

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Research has reported that allopathic drug therapy to be recommended following Bell's palsy [29]. The use of corticosteroids is recommended to avoid unsatisfactory patient outcomes and the addition of antiviral drugs therapy has additive benefits [30]. However, in our study, 64.3% of participants reported not taking recommended drugs. A review study by [7] recommended using corticosteroids therapy within 72 hours of the onset of Bell's palsy for a better outcome. Physical therapy 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 [31]. A study conducted among dental students (n=654) reported only 39% of dental students favored corticosteroid therapy [32]. 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 [20].

Limitations

The study is a regional study and the number of participants was relatively small. The retrospective study involved the participant's memory and may make mistakes while recollecting 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 can not be generalized to the whole nation. The actual number of patients with bells 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.

Conclusions

The incidence of Bell's palsy ~~is~~ was approximately 25.7 per 100,000 per year in the Qurayyat region of Saudi Arabia. Exposure to cold air and ~~common cold~~influenza ~~was~~ 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. A peak incidence was seen in the age group 21-30 years. The most favored treatment was physical therapy following Bell's palsy. The population in Qurayyat ~~region~~ region of Saudi Arabia needs to be educated about the potential benefits of combination therapy for improved patient outcomes rather than relying ~~on~~ upon complementary or traditional medicine alone.

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Table 1 (on next page)

Demodraphic data of participants

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	(2.564)*
11-20	32	18.7		
21-30	76	44.4		
31-40	16	9.4		
41-50	20	11.7		
51-60	14	8.2		
60 above	2	1.2		
Side Affected				
Right	96	56.1	Gender*Side Affected	(0.618)** 0.734
Left	63	36.8		
Bilateral	12	7		
Onset				
Sudden	129	75.4	Age Group*Onset	(9.244) * 0.160
Gradual	42	24.6		
Recurrence				
Frist time	153	89.5	Age Group*Recurrence	(31.053) * 0.152
Second time	4	2.3		
Third time	7	4.1		
Fourth time	6	3.5		
Fifth time	1	0.6		
Treatment following Bell's Palsy				
Physical Therapy	149	87.1	Age Group*treatment	(14.29) * 0.27
Traditional	32	18.7		
Drugs	61	35.7		
Acupressure	35	20.5		
Hot Iron	23	13.5		
Vitamins and nerve supplements	2	1.2		
No treatment	1	0.6		
Surgery	1	0.6		

Note: * Likelihood ratio, **Pearson's Chi-Square

Table 2(on next page)

Mutually inclusive responses on preferred treatment following Bells Plasy

N is number of responses and % is percentages of responses

1

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	87.1	22	12.9	57	33.3	0	0.0	30	17.5	1	0.6	2	1.2	15	8.8	429
Allopathic drugs	57	33.3	9	5.3	61	35.7	0	0.0	15	8.8	0	0.0	0	0.0	6	3.5	231
Hot iron	22	12.9	32	18.7	9	5.3	0	0.0	5	2.9	0	0.0	1	0.6	5	2.9	114
No treatment	0	0.0	0	0.0	0	0.0	1	0.6	1	0.6	0	0.0	0	0.0	0	0.0	3
Acupressure	30	17.5	5	2.9	15	8.8	1	0.6	35	20.5	1	0.6	0	0.0	6	3.5	144
Cosmetic surgery	1	0.6	0	0.0	0	0.0	0	0.0	1	0.6	1	0.6	0	0.0	0	0.0	5
Supplements	2	1.2	1	0.6	0	0.0	0	0.0	0	0.0	0	0.0	2	1.2	0	0.0	8
Hot Iron	15	8.8	5	2.9	6	3.5	0	0.0	6	3.5	0	0.0	0	0.0	23	13.5	74
Total	149	87.1	32	18.7	61	35.7	1	0.6	35	20.5	1	0.6	2	1.2	23	13.5	468

2 N=number of patients, %, percentage ofresponses

Figure 1

Flow diagram of recruitment of participants

Figure 1: Flow Diagram

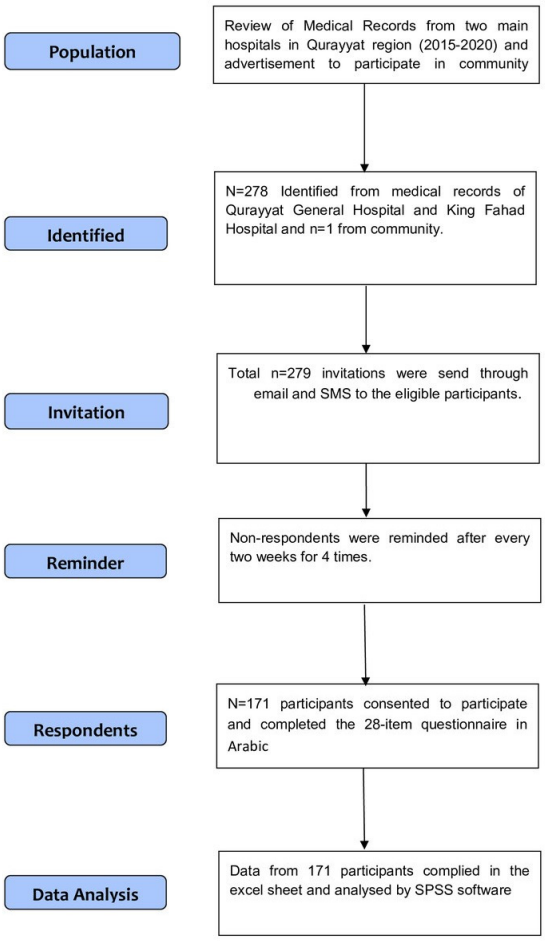
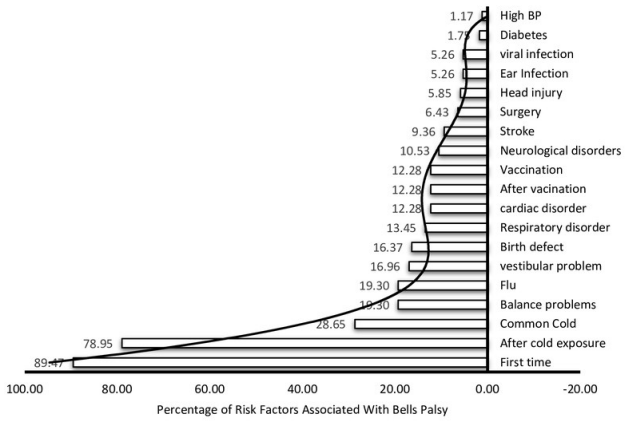


Figure 2

Percentage of risk factors associated with Bells Plasy


1.17
High BP
1.75
Diabetes
5.26
viral infection
5.26
Ear Infection
5.85
Head injury
6.43
Surgery
9.36
Stroke
10.53
Neurological disorders
12.28
Vaccination
12.28
After vacination
12.28
cardiac disorder
13.45
Respiratory disorder
16.37
Birth defect
16.96
vestibular problem
19.30
Flu
19.30
Balance problems
28.65
Common Cold
78.95
After cold exposure
89.47
First time
100.00
80.00
60.00
40.00
20.00
0.00
-20.00
Percentage of Risk Factors Associated With Bells Palsy