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Seasonal Pattern of Bell's Palsy Incidence in a Post-COVID-19 Context

COVID-19 Sonrası Bağlamında Bell Felci İnsidansının Mevsimsel Görülme Şekli

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ABSTRACT

Aim: This study aimed to investigate the seasonal effects on the incidence of Bell's palsy (BP), and to determine whether the rates fluctuate with changing seasons, particularly following the coronavirus disease 2019 (COVID-19) pandemic.
Material and Methods: A retrospective analysis was conducted on 267 confirmed BP cases between January 2020 and December 2023. Data were collected on the onset dates, demographic information, and seasonal distribution of the cases. Cases were categorized based on their seasonal occurrence to identify trends and variations.
Results: The study group included 137 males and 130 females, representing 51.3% and 48.7% of the sample, respectively. The mean age was 45.71±16.11 for males, and 47.51±19.27 years for females, with no significant difference (p=0.408). The overall mean age was 46.58±17.71 years. Although there was no statistically significant difference between seasons (p=0.322), a notable increase in BP incidence was observed in spring (28.8%) and summer (26.6%). The highest number of cases was observed in June and March. No significant difference was found in seasonal variations of BP incidence in terms of age (p=0.691) and gender (p=0.905).
Conclusion: Contrary to conventional beliefs associated with BP in colder climates, findings of this study indicate a higher incidence of BP during warmer seasons, particularly in spring and summer. This trend might have been influenced by the aftermath of the COVID-19 pandemic. These results underscore the need for comprehensive studies to explore the interplay between environmental factors, viral pandemics such as COVID-19, and BP pathogenesis, potentially leading to better prevention and management strategies.
Keywords: Facial paralysis; seasonal variation; COVID-19.

ÖZ

Amaç: Bu çalışmanın amacı, Bell's palsy (BP) insidansı üzerine mevsimsel etkileri araştırmak ve oranların değişen mevsimlere göre, özellikle koronavirüs hastalığı 2019 (coronavirus disease 2019, COVID-19) salgını sonrasında, dalgalanıp dalgalanmadığını belirlemektir.
Gereç ve Yöntemler: Ocak 2020 ile Aralık 2023 tarihleri arasında 267 doğrulanmış BP vakası üzerinde retrospektif bir analiz yapılmıştır. Vakaların başlangıç tarihleri, demografik bilgileri ve mevsimsel dağılımları hakkında veriler toplanmıştır. Eğilimleri ve varyasyonları belirlemek için vakalar mevsimsel oluşumlarına göre kategorize edilmiştir.
Bulgular: Çalışma grubuna, sırasıyla örneklemin %51,3 ve %48,7'sini temsil eden 137 erkek ve 130 kadın dahil edildi. Yaş ortalaması erkeklerde 45,71±16,11 ve kadınlarda 47,51±19,27 yıl olup aralarında anlamlı bir farklılık yoktu (p=0,408). Genel yaş ortalaması ise 46,58±17,71 yıl idi. Mevsimler arasında istatistiksel anlamlı bir farklılık olmamakla birlikte (p=0,322), ilkbahar (%28,8) ve yaz (%26,6) aylarında BP insidansında belirgin bir artış olduğu görüldü. En yüksek vaka sayıları Haziran ve Mart aylarında gözlendi. BP insidansındaki mevsimsel varyasyonlarda, yaşa (p=0,691) ve cinsiyete (p=0,905) göre anlamlı bir farklılık bulunmadı.
Sonuç: Soğuk iklimlerde BP ile ilişkili geleneksel inanışların aksine, bu çalışmanın bulguları daha sıcak mevsimlerde, özellikle ilkbahar ve yaz aylarında BP görülme sıklığının daha yüksek olduğunu göstermektedir. Bu eğilim, COVID-19 salgını sonrasında yaşananlardan etkilenmiş olabilir. Bu sonuçlar, çevresel faktörler, COVID-19 gibi viral pandemiler ve BP patogenezi arasındaki etkileşimi araştırmak için kapsamlı çalışmalara duyulan ihtiyacın altını çizmekte ve potansiyel olarak daha iyi önleme ve yönetim stratejilerine yol açmaktadır.
Anahtar kelimeler: Fasiyal paralizi; mevsimsel varyasyon; COVID-19.

INTRODUCTION

Bell's palsy (BP), a form of facial paralysis, presents clinically with rapid onset of muscle weakness on one side of the face, leading to significant facial asymmetry and functional impairment (1). BP is the most common cause of facial paralysis, accounting for approximately 60% of all facial paralysis cases (2). It can occur at any age, but is most common in individuals aged 15 to 60 years. Globally, it affects approximately 11-40 people per 100,000 annually (3). The incidence rate of bilateral BP was 0.3%. BP accounts for 60-70% of all cases of unilateral facial paralysis and affects both sexes equally. Recurrent BP has been reported in 9% of cases (4). Taverner et al. (5) suggested the following minimum diagnostic criteria for BP, which are widely applied in clinical settings: i) paralysis affecting all muscle groups on one side of the face, ii) sudden onset, iii) no indications of central nervous system (CNS) disease, and iv) no indications of ear or cerebellopontine angle disease. In addition to these criteria, BP may also present with other symptoms such as loss of taste, pain radiating to the postauricular region, and facial numbness.

The House-Brackmann scoring (HBS) system is used to evaluate the severity and progression of BP. Topographic testing was performed to localize the lesion along the facial nerve. Facial palsy can negatively affect psychological well-being and quality of life, leading to both functional and aesthetic deficits (6). 30% of patients are likely to experience long-term consequences such as incomplete eye closure, crocodile tears, oral incompetence during eating and drinking, articulation problems, muscle contractures, synkinesis, and facial discomfort (7). However, the exact etiology remains elusive, and emerging evidence suggests that viral infections, particularly reactivation of latent viruses such as herpes simplex virus (HSV), may play a crucial role in the pathogenesis of BP (7). Ischemia and autoimmune reactions are also considered potential causes (8).

Viral reactivation, possibly triggered by respiratory infections, tends to be more common during the cold season. Numerous studies have indicated that the incidence of BP varies significantly across different months and seasons (9). Incidence of BP varies geographically and temporally, often exhibiting seasonal patterns that may be related to environmental or infectious triggers. Historically, research has observed fluctuations in the incidence rate that could correlate with respiratory infections, including influenza and, as recently posited, coronavirus disease 2019 (COVID-19) infection (10,11). It can be overcome with asymptomatic or mild findings as well as severe, that can cause the death of patients (12). The pandemic has prompted an investigation into the relationship between COVID-19 and neurological manifestations, including BP, where viral mechanisms are believed to possibly incite neuropathic inflammation either directly or through immune-mediated pathways (13). A study from India reported an increased number of cases of BP during the current COVID-19 pandemic era and proposed a hypothesis regarding the probable role of coronaviruses in the pathogenesis of BP. This study suggests that the COVID-19 virus may have an effect on the immune status of individuals, alongside stress-induced reactivation of underlying viral infections (14). Another recent study reported an increased incidence of idiopathic facial palsy in children during the COVID-19 pandemic, reinforcing the potential relationship between viral infection and BP (15).

This study aimed to investigate the seasonal patterns of BP incidence in the post-COVID-19 context.

MATERIAL AND METHODS

This retrospective study analyzed the medical records of patients newly diagnosed with BP at Düzce Atatürk State Hospital. Approval was received for the study from the Düzce University Ethics Committee with the decision number 2024/181 dated 02.09.2024.

The study period, from January 2020 to December 2023, encompassed the post-pandemic phases and captured a comprehensive range of seasonal variations. Patients were included in the study based on the following criteria: formal diagnosis of BP confirmed by an otolaryngologist and a clearly documented date of symptom onset within the study period. Cases with alternative facial paralysis etiologies were excluded to maintain the diagnostic specificity. Data extraction from patient records focused on demographic information, date of symptom onset, clinical presentation details, and recovery outcomes when available. The seasonal categorization was based on established meteorological dates and aligned with the traditional divisions of spring, summer, fall, and winter.

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics for Windows (version 21.0, Armonk, NY: IBM Corp.). Continuous variables were described using mean and standard deviation, while categorical variables were presented as counts and percentages. The chi-square test was used to assess the differences in categorical variables. Statistical significance was set at $p<0.05$.

RESULTS

During the study period from January 2020 to December 2023, 267 patients diagnosed with BP were identified at the Düzce Atatürk State Hospital. The demographic features included 137 (51.3%) males and 130 (48.7%) females, with a broad age range from 8 to 88 years. The mean age was 46.58±17.71 years. The seasonal distribution of cases was as follows: spring, 77 (28.8%) cases, summer, 71 (26.6%) cases, winter, 61 (22.8%) cases, and fall, 58 (21.7%) cases (Table 1). While statistical analysis revealed no significant difference in the incidence of BP between the seasons ($p=0.322$), spring had the highest number of cases, followed by summer. The smallest number of cases was observed in the fall. The cases were most frequent in June (34 cases) and March (31 cases), with peaks in early summer and late spring (Figure 1).

In Düzce province, the average monthly temperature during winter was lower than that during the other seasons, which may have influenced the incidence of BP (Figure 2). The mean age of the patients diagnosed with BP in each season did not differ significantly ($p=0.691$). No significant difference was found in seasonal variations of BP incidence between males and females ($p=0.905$). Also, there was no significant difference in the BP incidence between the seasons in terms of the side of BP ($p=0.815$).

Table 1. Demographic and clinical characteristics according to the seasonal distribution

	Spring (n=77)	Summer (n=71)	Fall (n=58)	Winter (n=61)	p	Overall (n=267)
Age (years)	46.06±17.24	45.18±17.70	48.86±15.85	46.70±20.05	0.691	46.58±17.71
Gender, n (%)						
Male	41 (53.2)	34 (47.9)	31 (53.4)	31 (50.8)	0.905	137 (51.3)
Female	36 (46.8)	37 (52.1)	27 (46.6)	30 (49.2)		130 (48.7)
Side, n (%)						
Left	40 (51.9)	39 (54.9)	32 (55.2)	29 (47.5)	0.815	140 (52.4)
Right	37 (48.1)	32 (45.1)	26 (44.8)	32 (52.5)		127 (47.6)

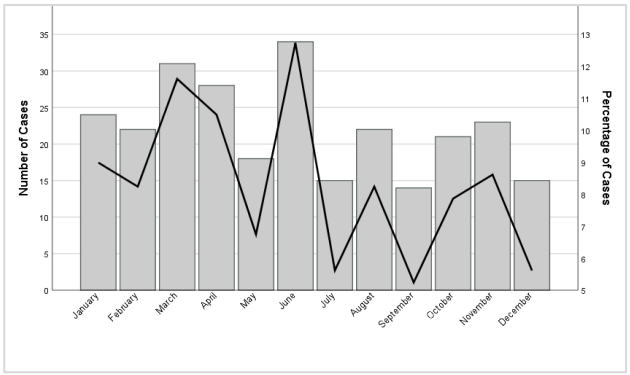


Figure 1. Distribution of cases by months

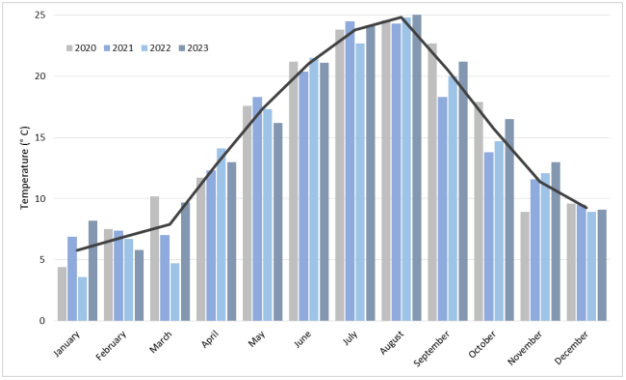


Figure 2. Monthly temperature between 2020 and 2023

Recovery outcomes were available for 210 (78.7%) patients. Among these, 180 patients (85.7%) experienced complete recovery, 25 patients (11.9%) showed partial recovery, and five patients (2.4%) showed no significant improvement at follow-up (time frame of follow-up was 6 months post-onset).

DISCUSSION

This retrospective study aimed to determine the influence of seasonal fluctuations and temperature variations on the incidence of BP, particularly following the COVID-19 pandemic. There are controversies regarding seasonal variations in BP. In the past three decades, 14 studies have reported the relationship between seasons, weather, and the incidence of BP (16). A study conducted in Denmark with BP patients found no evidence of seasonal variation or clustering (17). Similarly, a UK study involving BP patients reported no difference in incidence across different seasons (18). Research conducted in the USA with pediatric BP patients also found no seasonal pattern (19). However, more studies have reported monthly or seasonal variation in BP incidence than those reporting no seasonality. Erdur et al. (9) reported that the incidence of BP is significantly higher in winter. A Greek study reported that BP occurs more frequently during the winter months (20). Three studies conducted in Türkiye reported that BP occurs more frequently in winter months (2,21,22). Some studies have reported that peak incidence does not necessarily align with the coldest months of the year (16,23). However, the majority of studies suggest a higher incidence of BP in colder environments or during winter (7,9,20,24). Some studies have reported that BP occurs more frequently in warmer months (25,26). The present study has revealed a significant increase in the incidence of BP during the spring and summer months. These findings align with those of previous studies that suggested a seasonal pattern in BP. The finding of no significant difference in terms of age and gender in seasonal variations is also in line with other studies. The increased incidence of BP during the spring and summer months observed in this study is a notable finding, differing from the commonly held belief that colder seasons see higher cases due to increased viral infections (27). The findings of this study are consistent with recent findings that also report higher spring and summer incidences in other geographic locations, suggesting the influence of factors beyond cold stress in the pathogenesis of BP (28). Gunes and Karali (22) reported in their study that BP is frequently seen in the winter months in Bolu province, which is very close to Düzce (approximately 40 km) and has the same climatic conditions. The discrepancy between the present study and the study by Gunes and Karali (22) might be due to this research being conducted after the COVID-19 pandemic. The relation between COVID-19 and BP underscores the need to consider this pandemic as a potential influencing factor. COVID-19 is recognized for its array of symptoms that primarily affect the upper and lower respiratory tracts. Nevertheless, there is increasing evidence of COVID-19 cases displaying symptoms beyond the lungs, such as those affecting the nervous system (29). In the context of the COVID-19 pandemic, observational studies have commenced to explore shifts in the epidemiological trends of BP. One such study conducted in Korea, utilizing population data, aimed to discern the patterns in BP incidence (30). These investigations are critical in understanding whether there has been an appreciable impact on the incidence of BP in the wake of the pandemic, and whether any observed changes could be attributed to the viral infection itself, the associated immune response, or other indirect factors such as stress or changes in

environmental exposures. While the precise origin of BP is still not well defined, two main theories attempt to explain its etiology: one that considers vascular ischemia as a contributing factor, and the other that points to viral infections. The findings of the present study support the theory that infectious and inflammatory factors play a role in the development of BP. The novel coronavirus and its extensive impact on public health systems have created unprecedented conditions that may contribute to the pathophysiology of various diseases, including BP. COVID-19 has been associated with neurological manifestations, and emerging evidence has pointed towards potential viral contributions to the development of peripheral facial paralysis (31). A cohort study examined the occurrence rate of BP in individuals with COVID-19 compared with those who received vaccination. These findings indicate a higher relative risk of being diagnosed with BP in COVID-19 patients than in those who have been vaccinated (32). The pandemic has also brought about significant lifestyle and behavioral changes, such as increased stress levels due to social isolation and economic instability, which might indirectly influence the incidence of BP. Moreover, the inflammatory response and immune dysregulation associated with COVID-19 could predispose individuals to BP, potentially explaining the increased number of cases noted in this study during the pandemic period (33). It is also pertinent to consider that healthcare access challenges during the pandemic may have influenced the diagnosis and reporting of BP cases. The delay in seeking medical attention due to fear of exposure to the virus or the reprioritisation of healthcare resources could have impacted the observation and management of BP cases, possibly leading to underreporting in certain seasons and overrepresentation in others.

This study has some limitations. This single-center study calls for multicenter research to enhance validity. While the sample size is not very small, larger populations are needed for more robust conclusions. Further multicenter studies are needed to confirm a direct link between COVID-19 and BP seasonality.

CONCLUSION

This study provides evidence of significant seasonal variation in the incidence of BP, with higher rates observed during the spring and summer months. These findings challenge the traditional view of BP as a predominantly winter-associated condition and underscore the importance of considering seasonal factors in understanding the epidemiology of BP. Given the context of the COVID-19 pandemic, these results highlight the need for further research into the complex interplay between viral infections, environmental factors, and BP pathogenesis. Such insights could contribute to more effective prevention and management strategies and improve patient outcomes in the future.

Ethics Committee Approval: The study was approved by the Non-Invasive Health Research Ethics Committee of Düzce University (02.09.2024, 181).

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