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CORRELATION BETWEEN THE URBAN CLIMATE IN THE CITY OF PRESIDENT PRUDENT (STATE OF SÃO PAULO, BRAZIL) AND THE OCCURRENCE OF PERIPHERAL FACIAL PALSY

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Abstract: The present work had as objectives to trace the urban climate of the city of Presidente Prudente (State of São Paulo, Brazil), with emphasis on the air temperature; to evaluate the cases of peripheral facial paralysis (PFP), referred for rehabilitation at the Center for Studies and Care in Physiotherapy and Rehabilitation (CEAFIR), of the Science and Technology Faculty of UNESP – Presidente Prudente Campus, at different times of the year, over the period 2012-2014; to compare the incidence of peripheral facial palsy (PFP) in relation to the times of the year when the pathology occurred; and compare the incidence of peripheral facial palsy (PFP) in relation to air temperature at different times of the year. The city of Presidente Prudente is located in the west of the State of São Paulo, between the parallels of 22º07' south latitude and 51º23' west longitude, with an urban area of approximately 60 km² and an estimated population of 218,960 inhabitants, according to IBGE data. The city of Presidente Prudente is located under a tropical climate regime, in an area of climate transition, suffering the action of most atmospheric systems present in South America. While tropical systems give it high temperatures in spring and summer, extratropical systems cause episodes of invasion by cold fronts and polar air in autumn and winter, causing low temperatures. It has a tropical climate, with two defined seasons, a warmer summer/autumn period (average maximum temperatures between 27°C and 29°C) and very rainy (between 150 and 200 mm per month) and mild winters (with average minimum temperatures between 16°C and 18°C) and less humid (monthly rainfall between 20 and 50 mm). Therefore, the climatic seasonality of the city can be summarized as a hot and rainy period between October and March, and a milder and drier period between April and September, when temperatures drop with the entry of the polar masses. Peripheral facial palsy, in relation to involvement according to gender, is estimated to have a slightly higher prevalence among women and its incidence is bimodal, with peaks in the third and eighth decades of life. There is no consensus among the affected age group. The etiology of peripheral facial paralysis is quite diverse, including idiopathic causes, herpes zoster, traumatic, other viruses, neonatal causes, otitis media and sarcaidosis. Some experimental studies support the hypothesis of the etiopathogenic relevance of low temperatures, which may be related to a higher incidence of PFP during the coldest period of the year. However, the associations between the risk of developing Bell's palsy and seasonality, geographic, racial, ethnic and environmental factors, in particular, the association of lower temperatures with a higher incidence of PFP remains a matter of debate, since that there are few studies carried out to investigate the possible relationship between meteorological factors and pathogens of peripheral facial palsy. Due to discrepant data in the literature regarding the seasonality of PFP, as well as the scarcity of studies on this subject, the present work aims to analyze the seasonal distribution of PFP cases referred for physical therapy at CEAFIR. A spatial cut was performed (patients residing in the city of Presidente Prudente) and a temporal cut (between 2012-2014), and this period was chosen due to the considerable increase in demand for physiotherapy care motivated by a disclosure in the media from the city of Presidente Prudente and region. A total of 26 patients were treated with medical referral, 18 women and 8 men. The climate data of air temperature, at different times of the year, over the period 2012-2014, were collected according to those available at the FCT/

UNESP Meteorological Station – Presidente Prudente Campus.

Keywords: Urban climate. Air temperature. Peripheral facial palsy.

INTRODUCTION

Peripheral facial paralysis (PFP) results from the interruption of the nervous path of any of the facial nerve segments (VALENÇA and VALENÇA, 1999). The involvement results in the loss of unilateral or bilateral facial mimicry, from the eyebrow to the mouth, leading to an ipsilateral deviation of this hemiface (WANG and JANKOVIC, 1998). Among the origins are: idiopathic; the traumatic; the tumor; the infectious; and from other causes (VEILLON et al., 2008; MAGLIULO et al., 2005).

According to Almeida (1992) peripheral facial paralysis (PFP) that sets in abruptly or within hours, without infectious, traumatic or tumoral cause, receives multiple designations such as idiopathic peripheral facial paralysis (PFPI), "a frigore", rheumatic, ischemic, viral or Bell's palsy, among others. It corresponds to 75% of the causes of peripheral facial paralysis and is a condition faced by otorhinolaryngologists and neurologists, with divergences between both professionals regarding the treatment.

Also known as Bell's palsy, in honor of Charles Bell, a Scottish physician-surgeon and anatomist who first described the disease, its clinical characteristics are quite typical, that is, the person has difficulty, to a greater or lesser extent, in performing simple movements., such as frowning, raising the eyebrow, blinking or closing the eyes, smiling and showing the teeth, as the mouth moves only on the non-paralyzed side of the face.

Some of the possible causes of facial paralysis are: sudden change in temperature; stress; trauma; viral infection with herpes simplex, herpes zoster, Cytomegalovirus or others; rarely, it can be a consequence of other diseases.

It is known that one of the main factors of this pathological condition is that individuals exposed to low temperatures or sudden temperature changes (thermal shock) may suffer damage to the seventh cranial nerve and develop peripheral facial palsy (PFP) or paralysis. "freezer" facial.

In reference to the work hypothesis, this research raises the following question: is there a relationship between the occurrence of peripheral facial paralysis (PFP) and cold weather?

Due to discrepant data in the literature regarding the seasonality of peripheral facial paralysis (PFP), as well as the scarcity of studies on this topic, the present work aims to analyze the seasonal distribution of cases of peripheral facial paralysis (PFP) referred for physiotherapeutic care at the Centro of Studies and Services in Physiotherapy and Rehabilitation (CEAFIR), of the Science and Technology Faculty of UNESP – Presidente Prudente Campus.

OBJECTIVES

This work had the following objectives:

- Trace the urban climate of the city of Presidente Prudente (State of São Paulo, Brazil), with emphasis on air temperature;

- To evaluate the cases of peripheral facial paralysis (PFP), referred for rehabilitation at the Center for Studies and Care in Physiotherapy and Rehabilitation (CEAFIR), of the Faculty of Science and Technology of UNESP – Campus of Presidente Prudente, at different times of the year year, over the period 2012-2014;

- Compare the incidence of peripheral facial paralysis (PFP) in relation to the times of the year in which the pathology occurred;

- To compare the incidence of peripheral facial palsy (PFP) in relation to air temperature at different times of the year.

BIBLIOGRAPHIC REVIEW

Aspects on: the characterization of the urban climate; the characterization of the city of Presidente Prudente; the climatic characterization of the city of Presidente Prudente; the conceptualization of facial paralysis; and the characterization of peripheral facial palsy.

CHARACTERIZATION OF THE URBAN CLIMATE

Relevant studies on the urban climate (CHANDLER, 1965; BRYSON, 1972; MONTEIRO, 1976; LOWRY, 1977; OKE 1978; LANDSBERG, 1981; among others) agree that the city acts as an important modifying factor of the regional climate and creates specific conditions in the atmosphere defined as urban climate. The main factors responsible for the specificities are the buildings, the types of materials, the layout of the streets, the movement of vehicles, industries and human activities in general.

From the meteorological point of view, the study of the urban climate has reached a stage of characterization of its fundamental aspects, which can be presented as follows: a) the urban climate is a substantial modification of a local climate, and it is not yet possible to decide on the point of population concentration or density of buildings where this remarkable change begins; b) it is accepted that urban development tends to accentuate or eliminate the differences caused by the position of the site; c) from the comparison between the city and the surrounding countryside, the following fundamental facts emerged: 1) the city modifies the climate through alterations in the surface; 2) the city produces an increase in heat, complemented by changes in ventilation, humidity and even precipitation, which tend to be more pronounced; 3) the greatest influence manifests itself through changes in the very composition of the atmosphere, reaching adverse conditions in most cases (LANDSBERG, 1970).

The climate itself generated by the city causes effects that are felt by the population through thermal discomfort, air quality (increasingly polluted in large centers) and growing urban flooding caused by concentrated rainfall. "Thermal, hydrological and aerodynamic differences in urban surfaces create a specific urban climate" (JOHNSON, 1985, p. 221). These phenomena interfere in people's lives, generating consequences, in some cases, real catastrophes.

Considering the interference of urbanization in the climate, "the interrelated phenomena, such as heat islands, air pollution, heavy rains, floods, landslides, become part of the urban routine, superimposing one more phenomenon on the others, making the population is faced with this altered nature and lives daily with the problems resulting from it" (LOMBARDO, 1985, p. 18).

Landsberg (1970) presents changes in climate elements caused by urbanization and highlights that urban areas are hotter than rural ones, drier in summer, wetter in winter and cause concentrated rainfall, in addition to producing wind disturbances on the urban scale. Urban warming and roughness induce convergence and upward flow over the city and divergence just above it.

The city's climate is produced from an integrated game between atmospheric air and the urban environment built by man. Thus, the structure of the city must be accompanied by its functions in order to understand this complex environment.

CHARACTERIZATION OF THE CITY OF PRESIDENTE PRUDENTE

The city of Presidente Prudente is located in the west of the State of São Paulo, between the parallels of 22º 07' south latitude and 51º 23' west longitude, with an urban area of approximately 60 km² and an estimated population of 218,960 inhabitants, according to data from the IBGE.

Located on the western plateau, it is essentially made up of rocks from the Bauru group and is located about 560 km from the capital of São Paulo. With an average altitude of 472m above sea level, its relief is basically formed by medium, wide hills, elongated hills and spikes. The wide hills are present in the northern portion of the municipality, on the banks of the Rio do Peixe, and the medium hills are observed at the southern end, where the Cedro stream and the hills and spikes, predominant in the municipality covering about 80% of its area. territory (AMORIM, 2000).

As for the characteristics of the urban area of Presidente Prudente, it presents a great diversity of land occupation, as the oldest neighborhoods are densely built and with significant tree cover on the sidewalks and backyards.

CLIMATE CHARACTERIZATION OF THE CITY OF PRESIDENTE PRUDENTE

The city of Presidente Prudente is located under a tropical climate regime, in an area of climate transition, suffering the action of most atmospheric systems present in South America. While tropical systems provide high temperatures in spring and summer, extratropical systems cause episodes of invasion of cold fronts and polar air in autumn and winter, causing low temperatures.

The city of Presidente Prudente has a tropical climate, with two defined seasons, a warmer summer/autumn period (average maximum temperatures between 27°C and 29°C) and very rainy (between 150 and 200 mm per month) and mild winter (with average minimum temperatures between 16°C and 18°C) and less humid (monthly rainfall between 20 and 50 mm). Therefore, the climatic seasonality of the city can be summarized as a hot and rainy period between October and March, and a milder and drier period between April and September, when temperatures drop with the entry of the polar masses.

Amorim (2000) conducted an important study on the city of Presidente Prudente. This research was developed from two axes considered fundamental for the characterization of the urban climate: the first referred to the temporal analysis, through data collected at the Meteorological Station of the Faculty of Sciences and Technology of UNESP and the existing literature on the subject; the second concerned the spatial analysis that resulted from a close intra-urban and rural survey, to explain how the different geoecological and urban conditions respond to the performance of atmospheric systems.

According to Amorim (2000) the characteristics of temperature and relative humidity showed that Presidente Prudente has intra-urban and rural differences that allow demonstrating the existence of a specific urban climate, the result of the combination of the type of use and occupation of the soil, with the presence or lack of vegetation, altitude and exposure of slopes. The association of these factors allowed us to understand the temperature and relative humidity anomalies found in the field research in two months of the extreme seasons: January (summer) and July (winter). The types of weather were responsible for the greater or lesser magnitude of the phenomena

known as heat islands and coolness islands, as well as dry and humid islands.

Thus, Amorim (2000) concluded that Presidente Prudente, like the vast majority of Brazilian cities, grew without taking into account its climatic context. In this context, the relief, use and occupation of the soil, and the geo-environmental and urban conditions are fundamental to characterize the existing differences within the city itself and in the nearby rural zone, with the objective of diagnosing the alterations present in the urban atmosphere, the to contribute to city planning.

Peripheral involvement of the seventh pair of cranial nerves results in complete or partial paralysis of facial movements ipsilateral to the lesion and may be associated with: taste disorders, salivation and tearing, hyperacusis and hypoesthesia in the external auditory canal (VASCONCELOS et al., 2001).

Peripheral facial paralysis (PFP) requires specialized treatment and physiotherapeutic action aims to restore the expression of facial mimicry (GARAHANI et al., 2007). According to Beurskens and Heymans (2004) physiotherapy is essential with the main objective of restoring trophism, strength and muscle function. The resources suggested by the literature are: kinesiotherapy, massage and electrothermal therapy, confirmed by a randomized clinical trial and a systematic review (BEURSKEENS and HEYMANS, 2003; QUINN and CRAMP, 2003).

Santos and Guedes (2012) report that concern with functional performance satisfaction and quality of life (QoL) has increased in recent years. Quality of life reflects the perception that the needs of individuals are being met or that they are being denied opportunities to achieve happiness and self-realization, regardless of their physical health status or social and economic conditions (World Health Organization, 1998).

Communication is also one of the ways that reflects on human behavior, differentiating it from other animals, due to the ability to perform facial movements and the vocal production that enables expression (LAZARINI and FERNANDES, 2006).

Facial actions facilitate approaching or moving away from the other and are performed due to a visual orientation. Expressions of smile, surprise, resentment can present an approximation, a doubt or a rejection. It is clear that all these gestures, postures and mimics are at the service of emotional expression and this must be the motivation that will be associated with the motor response (GUEDES, 2006).

The movements of the facial muscles, constituents of the so-called facial expression or mimicry, allow non-verbal communication aimed at the expression of human emotions. When there is a change in these facial movements, functional, aesthetic, social and psychological sequelae may occur. The limitation of these facial movements is called facial paralysis (PF) which among the types is peripheral facial paralysis (PFP) (LAZARINI and FERNANDES, 2002; CALAIS et al., 2005).

In addition, society nowadays increasingly values aesthetics related to facial appearance, since the face is the place most exposed to the environment and its traits mark the individuality of the human being (VERONEZI, 2006).

According to Falavigna et al. (2008), some epidemiological studies (Campbell and Brundage, 2002; Danielides et al., 2001; De Diego et al., 1999; Yanai and Unno, 1988) were conducted with the purpose of evaluating the climatic effects on the development of Bell's palsy (PB).

Campbell and Brundage (2002) studied the effects of climate, latitude and seasons on the incidence of BP in US military personnel. In the analysis of 1,181 cases, the authors concluded

that living in arid climates and exposure to cold are independent risk factors for the development of BP. Exposure to cold and dry air, such as during the winter months in arid regions, could traumatize the nasopharyngeal mucosa, which could cause reactivation of the herpes simplex virus (HSV) infection.

Using a centralized surveillance system with demographic, military, and medical encounter data from US military service members, Campbell and Brundage (2002) estimated rates, trends, and demographic correlates of Bell's palsy risk over a two-year period. Poisson regression (a generalized form of linear model regression analysis used to model count data and contingency tables.) was used to estimate independent effects of climate, season, and latitude. From October 1997 to September 1999, there were 1,181 incident cases of Bell's palsy among US military service members. The crude incidence rate was 42.77 per 100,000 person-years. Incidence rates increased with age and were highest among women, blacks, Hispanics, married persons, and enlisted service members. Both climate (adjusted ratio ratio for arid versus non-arid climate = 1.34) and season (adjusted ratio ratio for cold versus warm months = 1.31) were independent predictors of risk for Bell's palsy. Latitude was not a statistically significant predictor when demographic, climatic, and seasonal effects were taken into account. The results are consistent with hypotheses concerning viral etiologies (eg, herpes simplex reactivation) of Bell's palsy.

Campbell and Brundage (2002) concluded that, over a two-year surveillance period, members of the US Armed Forces experienced a relatively high incidence of Bell's palsy. Arid climates and cold seasons were significant independent correlates of Bell's palsy risk. The results are consistent with the hypothesis that reactivations of herpes virus type 1 infections cause most cases of Bell's palsy. Low humidity, cold temperatures, ultraviolet radiation, co-infections of the upper respiratory tract and dry indoor air must be evaluated as possible triggers of this disease.

From Diego et al. (1999), in an observational study of 16 years, found that the incidence of Bell's palsy (BP) was lower during the summer.

The relationship between cold and the increase in the incidence of Bell's palsy (BP) was not observed in other studies (DANIELIDES et al., 2001; YANAI and UNNO, 1988).

CONCEPTUALIZATION OF FACIAL PARALYSIS

Facial paralysis is a disorder (paresis) or total paralysis of all or some muscles of facial expression. Facial paralysis can be classified as central or peripheral.

Facial paralysis can be divided into: central facial paralysis (CFP) or supranuclear; and peripheral facial paralysis (PFP), thus, nuclear and infranuclear (TESTA, 1997).

In central facial paralysis (CFP) there is an alteration in the facial nerve in the central motor pathway, before the pyramidal pathways. It is manifested by the loss of voluntary movements in the lower third of a hemiface contralateral to the lesion.

In central facial palsy (CFP) there is no involvement of salivary and lacrimal secretions, in addition to taste.

Peripheral facial palsy is caused by paralysis of the facial nerves, with inability to close the eye and move the lip on the affected side. Some of the initial and most frequent symptoms of facial paralysis include a feeling of numbness or weakness, a feeling of pressure or edema on the affected hemiface, changes in taste or even its abolition in certain internal regions of the oral cavity; noise intolerance, dry eye and pain around

it, as well as in the ear on the affected side. Facial paralysis is usually caused by a thermal shock, among other reasons.

Facial paralysis is a neurological alteration, almost always transient, that affects only one side of the face, leaving the individual with half of the face without expression. It can be caused by stress, changes in temperature, stroke or other factors and its treatment consists of medication intake and physiotherapy sessions.

Symptoms of facial paralysis are: crooked mouth, which is more evident when the individual smiles; dry mouth; lack of expression on one side of the face; inability to close one eye completely, raise one eyebrow or frown; headache; jaw pain; increased sensitivity to sound in one ear. These symptoms tend to regress within 3 weeks with proper treatment.

Facial paralysis occurs due to impairment of the nerves of the face that leaves the facial muscles paralyzed. It can occur along the path of the facial nerve still inside the brain or outside it. When it occurs inside it is a consequence of the stroke and when it occurs outside it is easier to treat and, in this case, the paralysis is called Bell's facial paralysis.

The diagnosis of facial paralysis is made through observation of the individual and, in most cases, it is not necessary to perform additional tests. However, to confirm that it is only a facial paralysis, magnetic resonance imaging can be used.

Treatment for facial paralysis is done with the ingestion of medications, such as Prednisone, use of eye drops, antivirals and physiotherapy.

The use of eye drops or artificial tears is essential to keep the affected eye properly hydrated and decrease the risk of corneal injury. To sleep, you must apply an ointment prescribed by the doctor and use eye protection, such as a blindfold, for example.

It is important that physical therapy exercises are performed several times a day, every day, to enhance the treatment.

Individuals who do not have remission of symptoms within 3 weeks may have permanent sequelae. Treatment time ranges from 3 months to 1 year.

The degree of recovery of facial nerve function depends on numerous factors. According to Valença and Valença (1999) the patient's age, the type of injury, the etiology, nerve nutrition, neuromuscular impairment and the therapy instituted represent the determining factors of the therapeutic prognosis. Ribeiro (1999) stated that the average time for recovery of the facial nerve can last from 15 days to four years. Cohen (2001) observed in 95 cases reviewed with pregnant women, complete recovery from Bell's palsy (the idiopathic form of PFP) in 56 women (58.9%) within four months or less. In a study of 36 patients with peripheral facial paralysis using kinesiotherapy, partial recovery was observed in 83.3% of participants after 15 days and total recovery in 63.8% after 30 days of physiotherapy (GÓMEZ-BENITEZ et al. al., 1995).

Marques (2015) carried out a study on the state of the art in the treatment of facial paralysis. He reports that facial expression is an essential part of human communication and one of the main means of expressing emotions. As a result, facial nerve dysfunction can be devastating and is often associated with depression, social isolation and poor quality of life. An interruption of the path of the facial nerve from the motor cortex to the muscles of facial expression is the most common factor of paralysis, which can result from various etiologies. The treatment of facial paralysis is a complex and challenging area of plastic surgery and several surgical procedures have been proposed in recent years in order to achieve adequate facial

reanimation. There are several options for static repair or dynamic facial nerve resuscitation. Despite the advances that have occurred in recent years, it has been very difficult to reach a level of functionality greater than 3 on the House-Brackmann scale.

CHARACTERIZATION OF PERIPHERAL FACIAL PARALYSIS

Peripheral facial paralysis (PFP) results from the interruption of the nervous trajectory of any of the segments of the facial nerve (cranial nerve VII pair) (VALENÇA and VALENÇA, 1999). The peripheral involvement of this cranial nerve results in complete or partial paralysis of the ipsilateral facial movements and may be associated with: taste disorders, salivation and tearing, hyperacusis and hypoesthesia in the external auditory canal (VASCONCELOS et al., 2001).

The PFP requires specialized treatment and the physiotherapeutic action aims to restore the expression of the facial mime (GARAHANI et al., 2007).

According to Beurskens and Heymans (2004) physiotherapy is essential with the main objective of restoring trophism, strength and muscle function. The resources suggested by the literature are: kinesiotherapy, massage and electrothermal therapy, confirmed by a randomized clinical trial and a systematic review (BEURSKEENS and HEYMANS, 2003; QUINN and CRAMP, 2003).

Individuals with PFP rarely start physiotherapeutic treatment at the onset of symptoms. They are often encouraged to wait for deficits to autoregress. However, complete recovery may not always occur, especially in high-risk populations such as the elderly or those who have delayed recovery (BRACH; VANSWEARINGEN, 1999). Physiotherapy for patients with PFP has traditionally been required through general exercises for the muscles of facial expression or electrostimulation (BRACH; VANSWEARINGEN, 1999).

The facial nerve is responsible for the motor innervation of most facial muscles and its impairment can lead to sensory, motor, psychological, behavioral and social disorders. Thus, an adequate clinical intervention is essential for the effective recovery of this dysfunction (BRACH et al., 1997).

The degree of recovery of facial nerve function depends on numerous factors. For Valença and Valença (1999) the patient's age, the type of injury, the etiology, nerve nutrition, neuromuscular impairment and the therapy instituted represent the determining factors of the therapeutic prognosis. Ribeiro (1999) stated that the average time for recovery of the facial nerve can last from 15 days to four years. Cohen (2001) observed in 95 cases reviewed with pregnant women, complete recovery from Bell's palsy (the idiopathic form of PFP) in 56 women (58.9%) within four months or less. In a study of 36 patients with peripheral facial paralysis using kinesiotherapy, partial recovery was observed in 83.3% of participants after 15 days, and total recovery in 63.8%, after 30 days of physiotherapy (GÓMEZ-BENITEZ et al., 1995).

Valença, Valença and Lima (2001) carried out a study that aimed to analyze clinical, epidemiological and evolutionary aspects of idiopathic peripheral facial palsy in 180 patients. There was a slight predominance of females (66.7%). As for the most affected age group, two incidence peaks were observed, one in the third and fourth decades, and the other in the sixth decade of life. In the 180 patients, there were 198 episodes of peripheral facial paralysis, 17 of which were recurrences and in one patient the initial paralysis was bilateral. In 15 patients (8.3%) there was recurrence of facial paralysis, in two cases the

paralysis was repeated twice more. In 12 cases (70.6%) the recurrence occurred on the same side as the previous paralysis. The left side of the face was involved in 55.6% of the cases. In eight patients, paralysis occurred during pregnancy (n=5) or postpartum (n=3). Four of the pregnant patients had Bell's palsy in the third trimester. An 18-year-old patient developed facial paralysis on the right side in the seventh month of pregnancy, with recurrence of the paralysis on the same side at the age of 23, on the 15th postpartum day. As associated conditions were found systemic arterial hypertension (11.7%), diabetes mellitus (11.1%), pregnancy or immediate postpartum (4.4%; 6.7% in women) and neurocysticercosis (1.1 %). In 72.8% of cases, no association was found with other conditions. One of the following sequelae was observed in 22.8% of the patients: hemifacial spasm (12.8%), partial recovery of the motor deficit (10.6%), crocodile tears syndrome (3.3%), synkinetic contractions (2.8%), tearing (1.1%) and inverted Marcus Gunn phenomenon (1.1%). They concluded that idiopathic peripheral facial paralysis can leave important cosmetic and functional sequelae, as well as cause paralysis relapse in a significant number of patients.

Amorim (2007) reports that peripheral facial paralysis is the total or partial involvement of the muscles of one hemiface causing loss of movement of the muscles of the face, that is, a paralysis of the mimic muscles causing an asymmetry of the face or immobility, modifying the physiognomic expression of the patient where there is a functional and aesthetic damage. It does not have a defined etiology, but it is associated with several factors such as tumor, trauma, congenital, infectious, etc. The signs and symptoms that are characteristic of peripheral facial palsy are due to the involvement of the VII cranial nerve (facial nerve). The rehabilitation of the condition is currently carried out by physiotherapy techniques and, little by little, with the integration of acupuncture. Regardless of the treatment applied, the objective is the return of the patient's facial expression and in 80% of the cases, the regression of the clinical manifestations is achieved.

Almeida (1998) carried out studies in which he presented 83 cases of peripheral facial paralysis "in the fridge" that occurred in Petrópolis, a mountainous city with a tropical climate, without a dry season, with an average temperature of 10°C to 23°C. He relates them to viruses that occur during the year. Fifty-six patients are from his clinic and have "follow up", while 25 others are patients from another clinic, for which only the onset of paralysis, gender, side and age are reported. It shows that the highest incidence occurred in the months of May, August, September and October. It also considers the etiology, incidence, prevalence, management, therapy and results in peripheral facial palsy.

According to Almeida (1998) peripheral facial paralysis, in relation to involvement according to gender, is estimated to have a slightly higher prevalence among women and its incidence is bimodal, with peaks in the third and eighth decades of life. There is no consensus among the affected age group. The etiology of peripheral facial paralysis is quite diverse, encompassing idiopathic causes (74%), herpes zoster (12%), traumatic (5%), other viruses (2%), neonatal (2%), otitis media (2%) and sarcaidosis (1%).

Almeida (1998) reports that some experimental studies support the hypothesis of the etiopathogenic relevance of low temperatures, which may be related to a higher incidence of PFP during the coldest period of the year. However, the associations between the risk of developing Bell's palsy and seasonality, geographic, racial, ethnic

and environmental factors, in particular, the association of lower temperatures with a higher incidence of PFP remains a matter of debate, since that there are few studies carried out to investigate the possible relationship between meteorological factors and pathogens of peripheral facial palsy.

According to Bento et al. (1985) the importance of topodiagnosis in peripheral facial paralysis is the precise anatomical location of the neural lesion. It consists of carrying out clinical tests to evaluate the functions of each of the branches of the nerve. The Facial Paralysis Group of the Hospital das Clínicas of the Faculty of Medicine of ''Universidade de São Paulo", with statistics of 873 patients, demonstrates that practically 50% of the cases, of the most diverse etiologies, presented a supragenicular lesion. The importance of this data is the indication of the access route, when surgical exploration of the facial nerve is necessary.

Tessitore, Paschoal and Pfeilsticker (2009) carried out a study that aimed to evaluate the proposed protocol of orofacial neuromuscular rehabilitation for peripheral facial paralysis. A prospective longitudinal study was carried out with clinical observation of 20 patients with grade IV paralysis, referred for orofacial rehabilitation at the Facial Paralysis Outpatient Clinic of the Unicamp Hospital de Clínicas. The verification of functional evolution or not, in rehabilitation, was based on the improvement of muscle tone, whose variation was measured by modifying the angle of the labial commissure. The study was carried out using images from the photographic documentation before (after fifteen days of facial paralysis installation) and after one year of treatment. To prove the effectiveness of the rehabilitation, the pre- and post-rehabilitation labial commissure angle was measured. The studied group was compared to a control group composed of nine subjects with grade IV facial paralysis, not submitted to orofacial rehabilitation. Data were statistically analyzed by the paired sample test (T-Student). The results showed that the average reduction of the labial commissure angle, with the treatment, was 7.9º, considered statistically significant ($p<0.001$). For the control group, the mean angular measurements were 100.9º + 1.9. This value does not differ from those initially measured in the studied group ($p=0.723$). They were significantly higher when compared to the mean final angular values of the group studied with treated patients ($p=0.001$). They concluded that the rehabilitation protocol used in this sample promoted a marked increase in muscle tone, with an improvement in facial rest.

Costa et al. (2006) carried out research that aimed to study the post-traumatic regeneration of the facial nerve in rabbits, by histological functional evaluation of the traumatized nerves compared to the normal contralateral ones. In the methodological part, twenty rabbits were submitted to compression of the left facial nerve trunk and sacrificed after two (AL group), four (BL) and six (CL) weeks of injury. Comparison between groups was made by total and partial densities of myelinated axons. For the statistical study, Tukey's method was used ($p\leq0.05$).

Costa et al. (2006) concluded that after compression trauma to the extratemporal facial nerve trunk of rabbits, loss of facial muscle activity was observed, with partial recovery two weeks later and complete recovery five weeks after the injury. In the qualitative analysis, a degenerative pattern was observed in AL, with greater tissue inflammation. In BL, signs of neural regeneration, practically complete in CL. Normal nerves (N) had a mean DT of 15705.59 and a mean SD of 21800.75. The BL group had a mean DT of 10818.55 and a mean SD of 15340.56 and the CL group had

a mean DT of 13920.36 and a mean SD of 16589.15. BL obtained 68.88%, and the CL group, 88.63% of N's DT. N showed a greater DP than the injured ones; however, this did not show statistical difference between BL and CL. Nerve DT proved to be a more reliable analytical method than the studied PD. In the qualitative histological analysis of the extratemporal facial nerve trunk, an axonal degenerative pattern with a more intense tissue inflammatory process was observed two weeks after the injury. After four weeks of injury, evident signs of neural tissue regeneration were observed, which became almost complete after six weeks of neural injury. In the quantitative histological analysis, the normal facial nerves showed a higher total transverse axonal density than the injured ones and the density of the injured nerves at six weeks was higher than that of the injured ones at four weeks. Normal nerves showed significantly greater partial transverse axonal density than injured ones. However, there was no statistical difference between injured nerves at four and six weeks. Total transverse axonal density of the nerve proved to be a more reliable analytical method for studying neural regeneration than partial axonal density in traumatic injuries to the extratemporal trunk of the facial nerve in a rabbit.

According to Vasconcelos et al. (2001) the peripheral paralysis of the VII pair of cranial nerves is due to the interruption of the nervous influx of any of its segments. This has different and varied etiologies, the traumatic being the one of greatest interest to the oral and maxillofacial surgeon, since it affects the face and/or temporal region. The authors addressed the various diagnostic methods, the most common types of prognosis and therapeutic approaches for peripheral facial paralysis of traumatic origin. They concluded that traumatic peripheral injuries without sectioning of the facial nerve evolve with good recovery with proservation (clinical and periodic follow-up of the patient over time) or drug treatment. Sectioned injuries require neurorrhaphy (suture of the two ends of a severed nerve), the most common being end-to-end.

According to Silva et al. (2012) peripheral facial paralysis (PFP) is characterized by the interruption, temporary or not, of facial muscle movements, with Bell's Palsy (PB) being the most prevalent. It affects both sexes; the hemifaces are affected with the same frequency; the incidence is higher after 70 years and lower in individuals younger than 10 years. PFP may be associated with acute otitis media and Herpes simplex virus 1 (HSV-1). The aim of the study was to retrospectively analyze and review the main topics related to BP, emphasizing treatment update. A retrospective bibliographical survey published during the period from 2005 to 2010 was carried out. The articles were analyzed and presented descriptively under the medication, physiotherapy and speech therapy aspect of the treatment. They concluded that there is therapeutic benefit with the use of Prednisolone together with Valacyclovir at the time of diagnosis of paralysis. However, even so, the treatment of BP needs further studies for a better therapeutic approach.

Wenceslau et al. (2015) carried out a study that aimed to evaluate, through surface electromyography (EMGs), the activity of the risorius and zygomatic muscles during the production of a voluntary smile, comparing the data in two groups of individuals with different times of onset of peripheral facial palsy (PFP). The study had the participation of 140 adults divided into three groups: G1 (35 individuals with onset of PFP between 0 and 3 months); G2 (35 individuals with onset of PFP between 3 and 6 months); and CG

(70 healthy control subjects). All participants were submitted to an evaluation that consisted of applying a clinical scale to assess facial movements and performing sEMGs in the region of the risorius and zygomatic muscles. The results indicated that the groups with facial paralysis, regardless of the time of onset of the disease, differed significantly from the group of healthy individuals in terms of muscle activity captured at rest and during voluntary smiling for both muscle regions tested. The groups with facial paralysis did not differ significantly when considering muscle activation for any of the assessments performed. The group with the longest facial paralysis time showed more asymmetrical muscle activation during voluntary smiling when compared to the other groups. Muscle asymmetry was more evident considering the functioning of the risorius muscle. They concluded that the sEMG results did not show differences between the groups according to the time of onset of the disease.

According to Cibuskis Júnior et al. (2007) peripheral facial paralysis (PFP) results from the interruption of the nerve path of the VII pair of cranial nerve (facial nerve) and represents a relevant sensorimotor dysfunction of physiotherapeutic intervention. Thus, the authors carried out a study that aimed to describe the results of scientifically supported physiotherapeutic action for a female patient (36 years old) with PFP. Ten sessions of 45 minutes each were carried out in the period between May 30, 2007 and June 22, 2007, at Hospital das Clínicas "Samuel Libânio", during the supervised internship of neurological physiotherapy at UNIVÁS (Universidade do Vale do Sapucaí). The treatment instituted consisted of superficial heat with infrared on both hemifaces, functional electrical stimulation (frequency of 50 Hz and pulse duration of 250 μs in compromised hemiface with an average of 50 contractions per session), facial neuromuscular facilitation (Kabath concept), massage and home guidelines. At the end of the treatment, there was an improvement in the expression of facial movements and the patient reported full satisfaction with the results and was discharged from physical therapy.

Santos and Guedes (2012) carried out a study that aimed to analyze the quality of life in individuals with acquired chronic peripheral facial paralysis. Twelve individuals with peripheral facial palsy acquired in the sequelae phase, with etiologies of Bell's palsy and Schwannoma after excision, were selected through screening. The degree of peripheral facial paralysis acquired according to House and Brackmann (1985) was verified, in addition to an interview with closed questions, to verify if there was interference of facial paralysis in the social life of each individual. The type of study was cross-sectional and the tests used were the non-parametric Mann-Whitney test and Fisher's exact test, with a significance level of 5%.

The results of the study by Santos and Guedes (2012) showed that the degrees of facial paralysis were divided as follows: I-II (normal to mild dysfunction); III-IV (moderately to moderately severe dysfunction); and V-VI (severe dysfunction to total paralysis). In the answers regarding impairment in professional and personal activities, individuals with a normal face and mild dysfunction due to Bell's facial palsy responded that they had no impairment in their activities; in the moderate to moderately severe dysfunction, all answered a lot of damage and in the severe dysfunction to total paralysis, one individual answered a lot of damage. In the facial paralysis due to Schwannoma, in the group classified as mild dysfunction, all responded no impairment and in severe dysfunction to total paralysis,

one individual responded very impaired for such activities. They concluded that acquired chronic peripheral facial paralysis interfered with the quality of life of individuals with degrees considered more severe. However, other studies are needed that address quality of life and acquired chronic peripheral facial palsy, since not enough studies were found that involved the two themes, especially in Brazil.

METHODOLOGY

A spatial cut was performed (patients residing in the city of Presidente Prudente) and a temporal cut (between 2012-2014), and this period was chosen due to the considerable increase in demand by patients undergoing medical referral for physiotherapeutic care at CEAFIR (Center for Studies and Assistance in Physiotherapy and Rehabilitation) motivated by a publicity in the media of the city of Presidente Prudente and region.

The climate data of air temperature, in the different periods of the year, between 2012 and 2014, were collected according to those available at the Meteorological Station of the Faculty of Sciences and Technology of UNESP – Campus of Presidente Prudente.

RESULTS

A total of 26 patients were treated with medical referral, 18 women and 8 men.

After initial assessment, using an Assessment Form specially designed for this purpose, it was possible to verify that the etiology (cause) of peripheral facial paralysis occurred due to thermal shock (15 patients), thermal shock and stress (2 patients), stress (2 patients), heat shock and diabetes (1 patient), herpes zoster (1 patient), pregnancy (1 patient) and unknown cause (4 patients).

In the topodiagnosis analysis (precise anatomical location of the lesion) it was possible to verify that the lesion on the face occurred on the right side (14 patients) and on the left side (12 patients).

The age range of patients was: 10 to 19 years (4 patients), 20 to 29 years (5 patients), 30 to 39 years (2 patients), 40 to 49 years (4 patients), 50 to 59 years (3 patients), 60 to 69 years (6 patients), 70 to 79 years (1 patient) and 80 to 89 years (1 patient).

Analyzing the occurrence of peripheral facial paralysis in the months of the year, it was verified that of the 26 patients treated: 02 in January: 02 in February; 01 in March; 04 in April; 01 in May; 01 in June; 01 in July; 04 in August; 01 in September; 05 in October; 02 in November; and 02 in December.

Considering the climatic seasonality of the city, that is, the hot and rainy period, between October and March and the milder and drier period, between April and September, when temperatures drop with the entry of the polar masses, there was a higher incidence between the period hot and rainy (October and March), in 14 patients and slightly milder and dry (April to September), in 12 patients.

FINAL CONSIDERATIONS

Despite being verified the etiology (cause) of the higher incidence of peripheral facial paralysis due to thermal shock in 18 patients out of a total of 26 patients in the city of Presidente Prudente (SP) treated at CEAFIR, in the period from 2012 to 2014, it was not possible establish a relationship between climate and temperature with the incidence of injury, according to studies carried out by Campbell and Brundage (2002), with more in-depth studies on this subject being essential.

With regard to physiotherapeutic treatment, further research is needed to determine the most appropriate treatment for individuals with PFP. A first step could be the validation of an evaluation system based on physical signs and symptoms of these

patients, as proposed by Cibuskis Júnior et al. (2007). This validation would make it easier to obtain scores that would better demonstrate the effectiveness of the physiotherapeutic intervention, supporting the performance of a professional who demonstrates its effectiveness through studies that are not yet well controlled, and especially through the personal satisfaction of countless patients with PFP.

REFERENCES

ALMEIDA, M. A. M. de. Paralisia facial periférica em Petrópolis. **Arquivos de Neuro-Psiquiatria**, São Paulo, v. 50, n. 1, p. 60-64, 1992. Disponível em: http://www.scielo.br/pdf/anp/v50n1/11.pdf. Acesso em: 28 jan. 2017.

AMORIM, F. T. R. **Paralisia facial periférica**: tratamento através da acupuntura e fisioterapia. Recife: Centro Integrado de Terapias Energéticas (CITE), 2007. 48f. Monografia (Especialização em Acupuntura). Disponível em: http://www.institutolongtao.com.br/arquivos/24072013010448.pdf. Acesso em: 28 jan. 2017.

AMORIM, M. C. C. T. **O clima urbano de Presidente Prudente/SP**. São Paulo, 2000. 374f. Tese (Doutorado em Geografia) – Faculdade de Filosofia, Letras e Ciências Humanas, Universidade de São Paulo.

BENTO, R. E.; VELLUTINI, E. A. S.; PAHL, F. H.; TEDESCO-MARCHESE, A. J.; FORMIGONI, G. S.; NAVARRO, H. C.; MINITI, A. Topodiagnóstico na paralisia facial periférica. **Arquivos de Neuro-Psiquiatria**, São Paulo, v. 43, n. 3, p. 275-280, 1985. Disponível em: http://www.scielo.br/pdf/anp/v43n3/06.pdf. Acesso em: 28 jan. 2017.

BEURSKENS, C. H. G.; HEYMANS, P. G. Physiotherapy in patients with facial nerve paresis: description of outcomes. **American Journal Otolaryngology**, v. 25, n. 1, p. 394-400, 2004. Disponível em: http://www.sciencedirect.com/science/article/pii/S0196070904000730?np=y&npKey=ac2cfc994644e13cf524f98f980b003a57681e2e4fc9b48ea1c99782d2166762. Acesso em: 28 jan. 2017.

BEURSKENS, C. H. G.; HEYMANS, P. G. Positive effects of mime therapy on sequelae of facial paralysis: stiffness, lip mobility, and social and physical aspects of facial disability. **Otology Neurotology**, v. 24, n. 1 p. 677-681, 2003. Disponível em: http://www.mm3admin.co.za/documents/docmanager/6e64f7e1-715e-4fd6-8315-424683839664/00023368.pdf. Acesso em: 28 jan. 2017.

BRACH, J. S.; VANSWEARINGEN, J. M. Physical therapy for facial paralysis: a tailored treatment approach. **Physical Therapy**, v. 79, n. 4, 1999. Disponível em: https://www.academia.edu/23413876/Physical_Therapy_for_Facial_Paralysis_A_Tailored_Treatment_Approach. Acesso em: 28 jan. 2017.

BRACH, J. S.; VANSWEARINGEN, J. M.; DELITTO, A.; JOHNSON, P. C. Impairment and disability in patients with facial neuromuscular dysfunction. **Otolaryngology-Head and Neck Surgery**, v. 117, n. 3, p. 315-321, 1997. Disponível: http://journals.sagepub.com/doi/pdf/10.1016/S0194-5998(97)70119-0. Acesso em: 28 jan. 2017.

BRYSON, R. A., ROSS, J. E. **The climate of the city**: urbanization and environment. Belmont: Duxbury Press, 1972.

CALAIS, L. L.; GOMEZ, M. V. S. G.; BENTO, R. F.; COMERLATTI, L. R. Avaliação funcional da mímica na paralisia facial central por acidente cerebrovascular. **Pró-Fono Revista de Atualização Científica**, Barueri, v. 17, n. 2, p. 213-222, 2005. Disponível em: http://www.scielo.br/pdf/pfono/v17n2/v17n2a09.pdf. Acesso em: 28 jan. 2017.

CAMPBELL, K. E.; BRUNDAGE, J. F. Effects of climate, latitude, and season on the incidence of Bell's palsy in the US Armed Forces, October 1997 to September 1999. **American Journal of Epidemiology**, v. 156, n. 1, p. 32-39, 2002. Disponível em: https://academic.oup.com/aje/article/156/1/32/73087/Effects-of-Climate-Latitude-and-Season-on-the. Acesso em: 28 jan. 2017.

CHANDLER, T. J. **The climate of London**. London: Hutchison of London, 1965.

CIBUSKIS JÚNIOR, P.; SANTOS, N. P. dos; OLIVEIRA, L. H. S.; SOUZA, R. A. de. Fisioterapia na paralisia facial periférica: estudo de caso. São José dos Campos, 2007. In: Encontro Latino Americano de Iniciação Científica, 11 e Encontro Latino Americano de Pós-Graduação, 7. Universidade do Vale do Paraíba. 2007. **Anais...** p. 1991-1995. Disponível em: http://www.inicepg.univap.br/cd/INIC_2007/trabalhos/saude/epg/EPG00359_01O.pdf. Acesso em: 27 jan. 2017.

COHEN H. **Neurociência para fisioterapeutas**. 2. ed. São Paulo: Manole, 2001.

COSTA, H. J. Z. R. et al. Regeneração pós-traumática do nervo facial em coelhos. **Revista Brasileira de Otorrinolaringologia**, São Paulo, v. 72, n. 6, p. 786-793, 2006. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0034-72992006000600009&lng=en&nrm=iso. Acesso em: 28 jan. 2017.

DANIELIDES, V.; PATRIKAKOS, G.; NOUSIA, C. S. et al. Weather conditions and Bell's palsy: five-year study and review of the literature. **BMC Neurology**, v. 1, n. 7, 2001. Disponível em: http://bmcneurol.biomedcentral.com/articles/10.1186/1471-2377-1-7. Acesso em: 28 jan. 2017.

DE DIEGO, J. I.; PRIM, M. P.; MADERO, R. et al. Seasonal patterns of idiopathic facial paralysis: a 16-year study. **Otolaryngology-Head Neck Surgery**, v. 120, p. 269-271, 1999.

FALAVIGNA, A.; TELES, A. R.; GIUSTINA, A. D.; KLEBER, F. D. Paralisia de Bell: fisiopatologia e tratamento. **Scientia Medica**, Porto Alegre, v. 18, n. 4, p. 177-183, 2008. Disponível em: http://revistaseletronicas.pucrs.br/ojs/index.php/scientiamedica/article/download/3578/3517. Acesso em: 28 jan. 2017.

GARANHANI, M. R.; CARDOSO, J. R.; CAPELLI, A. M. G.; RIBEIRO M. C. Fisioterapia na paralisia facial periférica: estudo retrospectivo. **Revista Brasileira de Otorrinolaringologia**, São Paulo, v. 73, n. 1, p. 112-115, 2007. Disponível em: http://www.scielo.br/pdf/rboto/v73n1/a18v73n1.pdf. Acesso em: 28 jan. 2017.

GÓMEZ-BENITEZ, D. A.; RIVAS, J. A. C.; GARCIA, E. F.; PENÃ, D.; MARITZA, S.; TORRES, L. M.; PANTALEON, Z. Terapia física en una población de pacientes con parálisis facial periférica. **Revista Medica Dominicana**, v. 56, n. 1 p. 22-24, 1995. Disponível em: https://www.bvs.org.do/revistas/Rmd/1995/56/01/RMD-1995-56-01-022-024.pdf. Acesso em: 28 jan. 2017.

GUEDES, Z. C. F. Reabilitação fonoaudiológica nas paralisias faciais congênitas. In: LAZARINI, P. R.; FOUQUET, M. L. **Paralisia facial**: avaliação, tratamento e reabilitação. São Paulo: Lovise, 2006. p. 169-72.

JOHNSON, D. B. Urban modification of diurnal temperature cycles in Birmingham, U. K. **Journal of Climatology**, v. 5, p. 221-225, 1985. Disponível em: http://onlinelibrary.wiley.com/doi/10.1002/joc.3370050208/pdf. Acesso em: 28 jan. 2017.

LANDSBERG, H. E. Meteorological observations in urban areas. **Meteorological Monographs**, v. 11, n. 33, p. 91-99, 1970.

LANDSBERG, M. E. **The urban climate**. New York: Academia Press, 1981.

LAZARINI, P. R.; FERNANDES, A. M. F. Anatomia do nervo facial. In: LAZARINI, P. R.; FOUQUET, M. L. **Paralisia facial**: avaliação, tratamento e reabilitação. São Paulo: Lovise, 2006. p. 1-10.

LAZARINI, P. R.; FERNANDES, A. M. F.; BRASILEIRO, V. S. B.; CUSTÓDIO, S. E. V. Paralisia facial periférica por comprometimento do tronco cerebral: a propósito de um caso clínico. **Revista Brasileira de Otorrinolaringologia**, São Paulo, v. 68, n. 1, p. 140-144, 2002. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0034-72992002000100024. Acesso em: 28 jan. 2017.

LOMBARDO, M. A. **Ilha de calor nas metrópoles**: o exemplo de São Paulo. São Paulo: HUCITEC, 1985.

LOWRY, W. P. Empirical estimation of urban effects on climat: a problem analysis. **Journal of Applied Meteorology**, v. 16, p. 129-135, 1977.

MAGLIULO, G.; D'AMICO, R.; CELEBRINI, A.; CUIULI, G. Postoperative Ramsay-Hunt syndrome after acoustic neuroma resection: viral reactivation. **Anales Otorrinolaringologicos Ibero-Americanos**, v. 32, n. 3, p. 253-259, 2005. Disponível em: https://www.ncbi.nlm.nih.gov/pubmed/16001695. Acesso em: 28 jan. 2017.

MARQUES, A. R. R. **Estado da arte do tratamento da paralisia facial**. 2015. 39f. Dissertação (Mestrado em Medicina - **Área: Cirurgia Plástica, Reconstrutiva e Estética). Faculdade de Medicina. Universidade do Porto, Porto, 2015. Disponível em:** https://sigarra.up.pt/ffup/pt/pub_geral.show_file?pi_gdoc_id=538429. Acesso em: 28 jan. 2017.

MONTEIRO C. A. de F. **O clima e a organização do espaço no estado de São Paulo**: problemas e perspectivas. São Paulo: IGEOG/USP, 1976. 54p. (Série Teses e Monografias, 28).

MONTEIRO C. A. de F. **Teoria e clima urbano**. São Paulo: IGEOG/USP, 1976. 181p. (Série Teses e Monografias, 25).

OKE, T. R. **Boundary layer climates**. London: Methuem & Ltd. A. Halsted Press Book, John Wiley & Sons, New York, 1978.

OMS. Organización Mundial de la Salud. **Promoción de la salud**. Glosario. Genebra: OMS, 1998. p. 1-35.

QUINN, R.; CRAMP, F. The efficacy of electrotherapy for Bells palsy: a systematic review. **Physical Therapy Reviews**, v. 8, n. 3, p. 151-164, 2003. Disponível em: http://www.crd.york.ac.uk/CRDWeb/ShowRecord.asp?AccessionNumber=12004008315. Acesso em: 28 jan. 2017.

RIBEIRO, E. C.; CASSOL, M. Enfoque fisioterápico & fonoaudiólogo na paralisia facial periférica. **Arquivos da Fundação Otorrinolaringologia**, São Paulo, v. 3, n. 1, p. 46-52, 1999. Disponível em: http://www.arquivosdeorl.org.br/conteudo/pdfForl/1999_0303_10.pdf. Acesso em: 28 jan. 2017.

RODRIGUES, R. E. C.; CECCATO, S. B.; REZENDE, C. E. B.; GARCIA, R. I. D.; COSTA, K. S.; CAMPILONGO, M.; RAPOPORT, P. B. Paralisia facial periférica análise de 38 casos. Arquivos Médicos do ABC, São Paulo, v. 27, n. 2, p. 62-66, 2002. Disponível em: https://www.portalnepas.org.br/amabc/article/view/347/328. Acesso em: 28 jan. 2017.

SANTOS, R. M. M.; GUEDES, Z. C. F. Estudo da qualidade de vida em indivíduos com paralisia facial periférica crônica adquirida. **Revista CEFAC**, São Paulo, v. 14, n. 4, p. 626-634, 2012. Disponível em: http://www.scielo.br/pdf/rcefac/v14n4/88-11.pdf. Acesso em: 28 jan. 2017.

SILVA, I. H. B.; LOPES, T. S.; MOTTA, E. N. M.; DEVERAS, J. L. A.; CÔRTES, P. C.; MARQUES, C. C. S.; ROSA, C. R. S.; SILVA, V. F. da; PEREIRA, A. B. C. N. G. Paralisia facial periférica de Bell: atualização do tratamento. **Revista de Saúde**, Vassouras, v. 3, n. 2, p. 40-48, 2012. Disponível em: http://www.uss.br/pages/revistas/revistasaude/revistasaudev3n2_2012/pdf/Edicao_RevistadaSaude_2012-2-p.40-48.pdf. Acesso em: 28 jan. 2017.

TESSITORE, A.; PASCHOAL, J. R.; PFEILSTICKER, L. N. Avaliação de um protocolo da reabilitação orofacial na paralisia facial periférica. **Revista CEFAC**, São Paulo, v. 11, supl. 3, p. 432-440, 2009. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1516-18462009000700019&lng=en&nrm=iso. Acesso em: 28 jan. 2017.

TESTA, J. R. G. Paralisia facial: diagnóstico e tratamento. **Revista Brasileira de Atualização em Otorrinolaringologia**, v. 4, p. 143-149, 1997.

VALENÇA, M. M.; VALENÇA, L. P. A. A. Nervo facial: aspectos anatômicos e semiológicos. **Revista Neurobiologia**, Recife, v. 62, n. 2, p. 77-84, 1999.

VALENÇA, M. M.; VALENÇA, L. P. A. A.; LIMA, M. C. M. Paralisia facial periférica idiopática de Bell: a propósito de 180 pacientes. **Arquivos de Neuro-Psiquiatria**, São Paulo, v. 59, n. 3B, p. 733-739, 2001. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0004-282X2001000500016&lng=en&nrm=iso. Acesso em: 28 jan. 2017.

VASCONCELOS, B. E. C.; DIAS, E.; DANTAS, W. R. M; BARROS, E. S.; MONTEIRO, G. Q. M. Paralisia facial periférica traumática. **Revista de Cirurgia e Traumatologia Buco-Maxilo-Facial**, Pernambuco, v. 1, n. 2, p. 13-20, 2001. Disponível em: http://www.revistacirurgiabmf.com/2001/v1n2/v1n2.2.pdf. Acesso em: 28 jan. 2017.

VEILLON, F.; TABOADA, L. R.; EID, M. A.; RIEHM, S.; DERBY, C.; SCHULTZ, P. Pathology of the facial nerve. **Neuroimaging Clinics of North America**, v. 18, n. 2, p. 309-320, 2008. Disponível em: http://www.sciencedirect.com/science/article/pii/S1052514908000038. Acesso em: 28 jan. 2017.

VERONEZI, R. J. B. **Análise tardia do grau de paralisia facial em pacientes operados de schwannoma vestibular**. Campinas. 100f. Dissertação (Mestrado em Ciências Médicas). Universidade Estadual de Campinas. Faculdade de Ciências Médicas, 2006.

WANG, A.; JANKOVIC, J. Hemifacial spasm: clinical findings and treatment. **Muscle & Nerve**, v. 21, n. 12, p. 1740-1747, 1998. Disponível em: http://onlinelibrary.wiley.com/doi/10.1002/(SICI)1097-4598(199812)21:12%3C1740::AID-MUS17%3E3.0.CO;2-V/epdf. Acesso em: 28 jan. 2017.

WENCESLAU, L. G. C.; SASSI, F. C.; MAGNANI, D. M.; ANDRADE, C. R. F. de. Paralisia facial periférica: atividade muscular em diferentes momentos da doença. **Revista CoDAS**, São Paulo, v. 28, n. 1, p. 3-9, 2016. Disponível em: http://www.scielo.br/pdf/codas/v28n1/2317-1782-codas-28-01-00003.pdf. Acesso em: 28 jan. 2017.

YANAI, O.; UNNO, T. Relationship between idiopathic peripheral facial paralysis and climate. **Acta Oto-Laryngologica. Supplementum**, v. 446, p. 27-29, 1988.