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ORIGINAL ARTICLE

OXIDATIVE STRESS AND ANTIOXIDANT STATUS IN BELL'S PALSY PATIENTS

Jaspreet Kaur[1], Anjuli Kapoor[2]

[1]Associate Professor, Department of Biochemistry, SUHMMHM Government Medical College, Saharanpur, U.P., India,
[2]Associate Professor, Department of Biochemistry, Rajshree Medical College, Bareily, U.P., India

ABSTRACT:
Background: Bell's palsy (BP) is the most common neurologic disorder characterized by unilateral facial paralysis. Immune, infective and ischaemic mechanisms are risk factors to the development of BP. Oxidative stress has been implicated as a potential risk factor of various diseases. The study was aimed to investigate the possible role of oxidative stress in BP patients. **Methods**: Fourty six patients with BP and 40 healthy subjects as a control were included in this study. Serum total oxidant status (TOS), total antioxidant status (TAS) and oxidative stress index (OSI) were measured. **Results**: Serum TOS activities and OSI values were significantly higher in patients with BP compared with the control group (P <0.05), whereas there was no significant difference between the groups in terms of TAS levels (P >0.05). **Conclusions**: Oxidative stress is increased in BP and it may be further helpful to clarify the etiopathogenesis of it. This may actively contribute to improve the management or prevention of the disease.
Keywords: Bell's palsy, oxidative stress, total oxidant status, total anti -oxidant status.

Corresponding author: Dr. Jaspreet Kaur, Associate Professor, Department of Biochemistry, SUHMMHM Government Medical College, Saharanpur, U.P., India

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INTRODUCTION:

Bells Palsy is one of the most common neurologic disorders affecting the cranial nerves, and is the most common cause of facial paralysis worldwide. It is thought to account for approximately 60-75% cases of acute unilateral facial paralysis.

Accounts of facial paralysis date back to 5th century BCE by Hippocrates. Sir Charles Bell described the anatomy of the facial nerve and its association with unilateral facial paralysis in 1821. Since then, idiopathic facial paralysis has been termed Bell's palsy. Bell's palsy describes an acute, unilateral facial paralysis. This entity is a clinical diagnosis after exclusion of the other etiologies of facial paralysis through an astute patient history, physical examination, and laboratory or imaging studies if necessary.[1,2]

Bell's palsy is defined by rapid onset, unilateral, lower motor neuron type of facial deficit, with lack of central nervous system, otologic, or cerebellopontine angle diseases. However, patients may have additional symptoms of hyperacusis, change in taste, facial sensation or pain, and epiphora. The facial paralysis can be partial or complete, although it is often self limited. It can occur in women, children, and men; however, it is more common in people 15 to 45 years of age. Patients with compromised immune systems, diabetes, and those who are pregnant are at higher risk. The resulting facial paralysis can have devastating implications for a patient's function and appearance. [1-3]

Oxidative stress is essentially an imbalance between the production of free radicals and the ability of the body to counteract or detoxify their harmful effects through neutralization by antioxidants.[4]

No any study has been conducted in past to find association between oxidative stress and bells palsy. By keeping this thing in mind present study has been carried out to find association between oxidant status (TOS), total antioxidant status (TAS) and oxidative stress index (OSI).

MATERIALS AND METHOD:

A total of **46** patients diagnosed with Bells palsy (26 males and 20 females) between March 2015 and May 2016 were included in the study.

Ethical clearance from Institution Ethical Committee was taken before the commencement of study. Written consent from all the patients involved in the study.

Patients were subjected to a detailed ear nose throat, neurological and systemic examination.

Exclusion criteria:

1. Chronic diseases or malignancies,
2. On long-term medication,
3. Smokers
4. Know cause of Facial paralysis

Inclusion criteria:

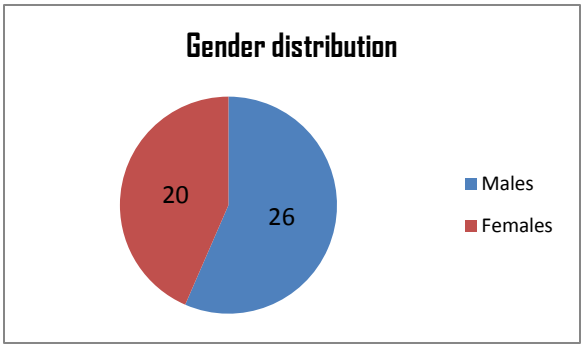
1. Age- and sex-matched healthy subjects (n=30) without any systemic disease in the control group
2. Unremarkable medical history and a normal physical examination.

None of the control subjects were taking antioxidant vitamin supplements.

RESULTS:

Fourty six patients suffering from Bells Palsy and **40** healthy control subjects were involved in the study.

There were **26** males (56.5%) and **20** females (43.5%) in the patient group and 20 females (50%) and 20 males (50%) in the control group.



Mean age was 46 ± 10 years (16–76 years) in the patient group and 45 ± 9 (15–70 years) in the control group. Difference between age and gender was statistically non-significant. (P >0.05).

Statistically non significant difference was observed between total anti-oxidant status in patient and control group (P >0.05). Total oxidant status (TOS), and the oxidative stress index (OSI) showed statistically significant difference among bell's palsy patients and control healthy subjects.

DISCUSSION:

The most common cause of acute onset unilateral peripheral facial weakness is Bell's palsy. It accounts for 60-70% of all cases of unilateral peripheral facial palsy. Either sex is affected equally and may occur at any age, the median age is 40 years. [3,5]

Present study has shown that males are affected more than females with median age of 42.5 years.

Bell's palsy is an acute peripheral facial weakness of unknown cause. The onset is sudden and symptoms typically peak within a few days. Bilateral idiopathic facial palsy occurs less frequently than unilateral involvement. About 7% of patients with history of Bell's palsy may experience recurrence. Immune, infective and ischaemic mechanisms are all potential contributors to the development of Bell's palsy, but the precise cause remains unclear.[1]

Oxidative stress reflects an imbalance between the systemic manifestation of reactive oxygen species and a biological system's ability to readily detoxify the reactive intermediates or to repair the resulting damage. Disturbances in the normal redox state of cells can cause toxic effects through the production of peroxides and free radicals that damage all components of the cell, including proteins, lipids, and DNA. Oxidative stress from oxidative metabolism causes base damage, as well as strand breaks in DNA. Base damage is mostly indirect and caused by reactive oxygen species (ROS) generated, e.g. superoxide radical, OH (hydroxyl radical) and H_2O_2 (hydrogen peroxide). Further, some reactive oxidative species act as cellular messengers in redox signaling. Thus, oxidative stress can cause disruptions in normal mechanisms of cellular signaling.[4,6]

Our study results revealed that OSI and TOS levels were higher in Bells patients patients compared with healthy control subjects. Nonetheless, there was no significant difference in terms of TAS levels between the groups. OSI represents the ratio of TOS to TAS, leading to a more objective evaluation than the measurement of OS.

Bell's palsy is caused by inflammation or compression of the facial nerve (cranial nerve VII), which controls the muscles of the face. Infection by a virus is believed to cause swelling and inflammation of the nerve, which in turn restricts the flow of oxygenated blood through the narrow canals (known as the facial or Fallopian canals) holding the nerves on either side of the face near the ears. However, the exact events leading to this inflammation remain unknown.

Table 1: Total antioxidant status (TAS), of patients with BP and control subjects

Parameters	Patient Group (n=46)	Control Group (n=40)	*P*
TAS (mmol Trolox Eq/L)	1.62 ± 0.42	2.6 ± 0.62	0.86
TOS (mmol H2O2 Eq/L)	24.6 ± 16.4	12 ± 6.6	0.0024 (Sig.)
OSI (arbitrary unit)	16.4 ± 8.6	4.6 ± 3.2	0.0012 (Sig.)

Oxidants enhance interleukin-1, interleukin-8, and tumor necrosis factor production in response to inflammatory stimuli by activating the nuclear transcription factor, NF kappa B. Sophisticated antioxidant defenses directly and indirectly protect the host against the damaging influence of cytokines and oxidants. Indirect protection is afforded by antioxidants, which reduce activation of NF kappa B, thereby preventing up-regulation of cytokine production by oxidants.[7]

BP is more common in patients with diabetes mellitus and pregnant women, especially those in the third trimester

Increased TOS and OSI levels and defects of antioxidant protection have been shown in studies investigating the OS status in patients with diabetes mellitus. Similarly, increased OS and decreased TAS were reported during pregnancy in studies evaluating OSI. The higher incidence of both OS and BP in diabetes mellitus patients and pregnant women supports the link between high OS status and BP determined in the patient group.[8]

Further studies with larger sample size required in addition to grouping patients according to the stage of disease. Oxidant stress status of patients before and after treatment and the correlation between treatment responses should also be evaluated.

CONCLUSION

Present study suggested that oxidative stress is increased in BP and it may be further helpful to clarify the etiopathogenesis of it. This may actively contribute to improve the management or prevention of the disease.

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