

Controlled Vestibular Stimulation: A Physiological Method of Stress Relief

KUMAR SAI SAILESH¹, ARCHANA R², MUKKADAN J K.³**Keywords:** Controlled vestibular stimulation, Stress

INTRODUCTION

Stress is the generalized, non specific response of the body to any factor that overwhelms or threatens to overwhelm, the body's compensatory abilities to maintain homeostasis. High levels of stress in college students is hazardous as it not only effect their academic performance but also affect their health conditions. For many young adults, college is the best time of life. These critical years of adjustment can also be undermined by depression, anxiety, substance abuse and eating disorders. Researchers are finding that many mental illnesses are traced to trauma, whose damage surfaces in times of stress and change, such as the college years [1]. March is the year's most dreaded month for Indian students: it's exam time and the pressure to excel can be destructive. In recent years, it happens sometimes that college students suffer from physical or mental illness, which even leads to temporary absence from school or even suicide [2]. According to the National Crime Records Bureau, 5,857 Indian students attempted suicide due to exam stress in 2006 [3]. Physiological studies have shown that stress from any source can influence endocrine, haemopoietic and immune systems [4]. High level of stress may have adverse effect on academic achievement. Stress in students is also due to lack of guidance [5]. Adapting coping strategies that are beneficial during stressful experiences have to be encouraged. Coping is defined as the process of managing stressful demands and challenges that are appraised as exceeding the resources of the person [6]. Preventive measures can be aimed at preventing the consequences.

The vestibular system remains enigmatic among the human senses. It responds to the position of the head in relation to vestibular motion, specifically, gravity and accelerated or decelerated motion. Research has shown many benefits from vestibular stimulation including decreased self stimulation, decreased hypersensitivity, increased postural security, increased concentration and attentiveness, increased balance, increased body awareness, calming effects, reduction of abnormal muscle tone at slow speeds and increased alertness at high speeds [7]. Stimulating vestibular system by controlling direction, duration, frequency and intensity. Ideal direction, duration, frequency and intensity are yet to be determined. Hammam E et al., suggested that low frequency stimulation is beneficial. [8] Winter et al., reported that they have observed decrease in salivary cortisol in volunteers who subjected to front to back motion on a hexapod [9]. vestibular under stimulation, does not have any effect or mild effect and over stimulation causes nausea, vomiting and radical fluctuations in pulse and respiration [7]. It was reported that controlled vestibular stimulation provides more soothing effects [10]. In the present case we have applied controlled vestibular stimulation for the first time to reduce stress in college student.

CASE REPORT

While screening the students to select for our research work at Little Flower Medical Research Centre, Angamaly, we have found Miss B, a 18 years old college student with Height 157cms, Weight-

46kg BMI = 18.66 kg/m² (Healthy weight) having abnormal pulse rate (130±2.10) and BP (159±5.06/93.5±2.35) at rest. On advice she underwent haematological, salivary cortisol and random blood glucose estimations and was found abnormal values [Table/Fig-1]. Salivary samples were collected at 1 pm following the guidelines provided by salimetrics lab. Her ECG indicates sinus tachycardia and she reported that she is under stress all the time and her menstrual cycle was irregular from past 8 months. No family history of hypertension is present. We advised her to start vestibular stimulation on a swing back to front direction. She was advised to adjust frequency, duration and intensity, depending on her level of comfort. We have installed two swings at our physiological garden to give vestibular stimulation [11]. She started to swing for 4 minutes duration with frequency of 24 cycles/min and intensity 200cms from centre to front and 194 cms from centre to back and she reported that she was comfortable with this stimulation. She continued vestibular stimulation till date and willing to continue in future. We are presenting her status till date. On 150th day of vestibular stimulation she reported that her menstrual cycle was almost normal and, her salivary cortisol, blood pressure and blood glucose and haematological parameters were almost normal [Table/ Fig-1-4].

DISCUSSION

History of vestibular research is 400 years old story. The first detailed descriptions of the vestibular system were published in "De Auris Auditus Organi Structura" in 1610 [12]. Vestibular stimulation inhibits

Measurement	Day 0	Day 60	Day 90	Day 150	p-value
Pulse rate (beats/min)	130±2.10	123±3.95	105±2.76	84.17±4.49	<0.001
Systolic blood pressure (mm Hg)	159±5.06	147.33±3.27	137.67±8.14	104.67±51.42	0.012
Diastolic blood pressure (mm Hg)	93.5±2.35	88.67±1.63	78.33±6.86	75.33±4.13	<0.001
Pulse pressure (mm Hg)	65.5±3.93	58.67±3.50	58±8.29	49.67±2.66	<0.001
Mean arterial blood pressure (mm Hg)	115±2.97	108±1.67	97.67±6.59	91.83±4.02	<0.001

[Table/Fig-1]: Changes in blood pressure

Salivary Cortisol	
Day 0	1.33 ug/dl
Day60	0.91 ug/dl
Day 90	0.56 ug/dl
Day 150	0.36 ug/dl

[Table/Fig-2]: Changes in salivary cortisol

Random Blood glucose	
Day 0	168mg/dl
Day 60	143mg/dl
Day 90	140mg/dl
Day 150	126mg/dl

[Table/Fig-3]: Changes in random blood glucose

	Day 0	Day 60	Day 90	Day 150
RBC (millions/cumm)	5.3	5.15	4.97	4.93
Lymphocytes %	16	23	28	36
Neutrophil %	78	70	64	56
Basophils %	0	1	2	3
Eosinophils%	1	2	1	2
Monocytes %	5	4	5	3
Total WBC (cells/cumm of blood)	14300	11000	10000	9650

[Table/Fig-4]: Changes in RBC, WBC, DLC

both the stress axes (hypothalamic-pituitary-adrenocortical (HPA) and sympathetic adrenomedullary (SAM))and decreases cortisol level and heart rate and blood pressure within normal limits. Swaying appears to decrease salivary cortisol levels in African elephants [13]. Infants who received auditory, tactile, visual and vestibular interventions showed a significant steady decline in cortisol [14-16]. Poor or inadequate sleep can cause irritability and stress [17]. Vestibular stimulation relieves pain and promotes sleep and balance stress [18,19]. Vestibular stimulation also improves cognition [20]. Rocking is soothing and may be due to involvement of brainstem inhibitory mechanisms [9]. In the present case we have observed steady and significant decrease in salivary cortisol, Blood pressure and blood cell counts followed by controlled vestibular stimulation.

CONCLUSION

The present case shows that controlled vestibular stimulation reduces stress and can be of use in similar cases. Hence we recommend further detailed study in this area.

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PARTICULARS OF CONTRIBUTORS:

1. Research Scholar, Department of Physiology, Little Flower Medical Research Centre, Angamaly, Kerala, India.
2. Associate Professor, Department of Physiology, Saveetha Medical College, Chennai, India.
3. Research Director, Department of Physiology, Little Flower Medical Research Centre, Angamaly, Kerala, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Archana R,
Associate Professor, Department of Physiology, Saveetha Medical College, Thandalam, Chennai-602105, India.
Phone : 09840608149, E-mail : dr.archana@gmail.com

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