

Hand Grip Test

In the hand grip test, there is a rise in heart rate and blood pressure. The blood pressure rise is due to increased sympathetic activity and heart rate rise is due to decreased parasympathetic activity. Subject was made to lie down in semi recumbent position. ECG electrodes were connected for lead II recording of ECG and sphygmomanometer for blood pressure measurement. Basal heart rate and blood pressure were recorded. Subject was asked to maintain a pressure of 30% of the maximum activity in the hand grip dynamometer for about 5 minutes. Heart rate and change in SBP, DBP were recorded.

Blood pressure response to standing

Patient is again allowed to assume a supine position, and a recording of blood pressure is done in the supine position. Patient is then asked to stand up and blood pressure is recorded at 0 and 1 minute intervals. The Autonomic function tests which were performed to assess the cardiovascular parasympathetic functional status:

Deep breathing test

This test is used to assess the parasympathetic activity. Subject was instructed to maintain deep breathing at a rate of six breaths per minute and was made to lie down comfortably in supine position with head elevated to 30°. ECG electrodes were connected for recording Lead II ECG. While subject was breathing deeply at a rate of 6 breaths per minute (allowing 5 seconds each for inspiration and expiration) maximum and minimum heart rates were recorded with each respiratory cycle. Expiration to inspiration ratio was determined by using the formula.

Valsalva Manoeuvre

The valsalva ratio is a measure of parasympathetic and sympathetic functions. Subject was made to lie down in a semi recumbent or sitting position. Nostrils were closed manually. Mouth piece was put into the mouth of the subject and the Mercury manometer was connected to the mouth piece. ECG machine was switched on for continuous recording. Subject was asked to exhale forcefully into the mercury manometer and asked to maintain the expiratory pressure at 40 mm of Hg for 10 – 15 seconds. ECG changes were recorded throughout the procedure, 30 seconds before and after the procedure. Valsalva ratio were calculated by using the formula.

Heart rate response to standing

On changing the posture from supine to standing heart rate increases immediately by 10-20 beats per minute. This response is detected by recording ECG in supine and standing postures. Subject was made to lie down in supine posture. ECG electrodes were connected from the subject to the cardiowin system. Subject was asked to relax completely for a minimum period of 10 minutes. Basal

heart rate was recorded by using cardiowin system. Subject was asked to stand up immediately and change in heart rate is noted from the monitoring screen of cardiowin. Heart rate response to standing was determined by using the formula heart rate in standing position – heart rate in supine position.

RESULTS

The collected data was expressed as Mean $\pm$ SD. These results were analyzed by ANOVA with SPSS version 17.0 using an unpaired 't' test. The results of the above tests were compared between Study group and control group

Table 1: Shows that there were no significant findings between anthropological variables like age and BMI.

Table 1 Anthropometric variables

Variables	Control group (n = 30)	Study group (n = 30)	P value
Age (yrs.)	18.96 $\pm$ 1.76	20.00 $\pm$ 1.68	0.91
Height (cm)	164.60 $\pm$ 8.26	166.68 $\pm$ 6.93	0.07
Weight (Kg)	57.16 $\pm$ 9.73	57.96 $\pm$ 9.11	0.74
BMI (Kg/m ²)	21.54 $\pm$ 2.61	21.96 $\pm$ 2.2	0.55

Table 2: Shows that the physiological findings like basal heart rate, SBP and DBP values were found to be higher in subjects of study group as compared with control group but this difference was statistically insignificant ($p > 0.05$).

Table 2 Physiological considerations

Variables	Control group (n = 30)	Study group (n = 30)	P value
Basal Heart rate BPM	84.28 $\pm$ 4.95	86.11 $\pm$ 5.11	0.05
Resting SBP (mm of Hg)	115.64 $\pm$ 4.92	119.52 $\pm$ 6.30	0.06
Resting DBP (mm of Hg)	76.64 $\pm$ 5.02	81.40 $\pm$ 4.69	0.23
Resting RR (breath/min)	13.01 $\pm$ 3.26	14.68 $\pm$ 4.61	0.74

Table 3: Shows that all the parasympathetic autonomic function tests like heart rate response to standing i.e. 30:15 ratio, heart rate response to deep breathing i.e. E: I and valsalva ratios in the children of study group were almost similar to control group. These results were statistically not significant ($p > 0.05$). It indicates that the parasympathetic reactivity tests are similar in both the groups.

Table 3 Statistical analysis of Parasympathetic function tests in Study group and control group

Variables	Control group (n = 30)	Study group (n = 30)	P value
Heart rate response to standing 30:15 Ratio	1.15 $\pm$ 0.05	1.17 $\pm$ 0.04	0.12
Valsalva ratio	1.25 $\pm$ 0.02	1.26 $\pm$ 0.04	0.26
Heart rate response to deep breathing E: I Ratio	1.25 $\pm$ 0.02	1.23 $\pm$ 0.05	0.07

Table 4: shows that all the sympathetic autonomic function tests like Blood pressure response to standing, Cold pressor test and Hand grip test shows marginally higher values in study group as compared with the control group. These findings were statistically significant ($p < 0.001$ and $p < 0.05$). It indicates that hyperactivity of sympathetic nervous system in children of study group.