Biochemical Analyses of Kayaking and Rowing Paddlers in India: A Cross-Sectional Study

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Abstract: The study was intended to analyse the Biochemical Parameters of Kayaking and Rowing paddlers. We recruited Eighteen (N=18), male college level Kayakers (N=9) and Rowers (N=9) of age 21-26 years to act as subjects. The purposive sampling technique was followed to approach the subjects. Blood samples were obtained and subsequently analysed for Haemoglobin, Total Cholesterol, LDL-Cholesterol, HDL-Cholesterol and Triglycerides. The Student’s t-test was employed for between-group comparisons on each variable. The results revealed significant difference with regard to the variable LDL-Cholesterol (Low Density Lipoprotein Cholesterol). However, no significant differences were found on the variables: Haemoglobin, Total Cholesterol, HDL-Cholesterol (High Density Lipoprotein Cholesterol) and Triglycerides between Kayakers and Rowers.

Keywords: rowing, kayaking, hematological, biochemical

I. Introduction
Ideal sports performance depends on optimal capacity of numerous physiological systems, including the biochemical parameters (Pendergast et al., 1989; 2003; 2005; Zamparo et al., 1999). The term 'lipid profile' portrays the changing levels of lipids in the blood, the most commonly discovered ones are low-density lipoprotein (LDL) cholesterol, high-density lipoprotein (HDL) cholesterol and triglycerides (Lemura, et al, 2000). Abnormal states of LDL cholesterol show surplus lipids in the blood, which thusly increment the danger of cardiovascular problems (Friedewald, 1972). HDL cholesterol transports lipids back to the liver for reusing and transfer; therefore, elevated amounts of HDL cholesterol are a pointer of a sound cardiovascular framework (Carroll et al, 2012). Triglycerides in plasma are developed from fats eaten in food or from other vitality sources. It has been well known that elevated amounts of total cholesterol, triglycerides, LDL-Cholesterol and low levels of HDL-Cholesterol are the risk factors for coronary illness. Physical exercises performed with adequate frequency and power is compelling in bringing down the levels of triglycerides and LDL-cholesterol and raising the level of HDL-cholesterol (Fauci et al, 2004).

Previously, research onto Kayaking and Rowing was primarily focused on physiological testing of the athletes in order to determine fitness levels and then designing training programs to optimize physiological fitness (Aitken and Neal, 1992). In the present study, the researchers examined acquired data to see the variations between Kayakers and Rowers on Biochemical variables.

II. Method Material

Sample
Eighteen (N=18), male college level players nine of each Kayaking and Rowing between the age group of 21-26 years were recruited as subjects. The objective and protocol was explained to the subjects and their verbal consent to participate in the study was taken. Distribution and demographicsof subjects are brought forth in Table 1.

Table 1: Distribution and demographics of subjects

<table>
<thead>
<tr>
<th>Sample Size (N=18)</th>
<th>Total (N=18)</th>
<th>Kayaking (n=9)</th>
<th>Rowing (n=9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>23.16±2.21</td>
<td>23.56 ± 1.94</td>
<td>22.78 ± 2.64</td>
</tr>
<tr>
<td>Height</td>
<td>173.61±4.79</td>
<td>170.56 ± 3.56</td>
<td>176.67 ± 3.87</td>
</tr>
<tr>
<td>Weight</td>
<td>74.52±4.24</td>
<td>72.71 ± 3.52</td>
<td>76.33 ± 4.30</td>
</tr>
</tbody>
</table>
Procedure
Blood samples were taken by a qualified phlebotomist only from those subjects who gave their verbal consent. Haematology analyser (Celldyne model 3500) was used to determine blood haemoglobin concentration. Blood samples were analysed in private laboratory for following lipid parameters:

- Total cholesterol
- LDL-Cholesterol (Low density lipoprotein)
- HDL-Cholesterol (High density lipoprotein)
- Triglycerides

III. Statistical Procedure
Statistical analysis was done using IBM SPSS statistics data editor version-21. Data were expressed as means and standard deviations. The Student’s independent t-test was employed for comparing the groups statistically. The hypotheses were tested at 0.05 significance level.

IV. Results

Table 2: Descriptive and Inferential statistics of Biochemical Parameters of Indian Kayakers and Rowers

<table>
<thead>
<tr>
<th>Variable</th>
<th>Kayaking</th>
<th>Rowing</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haemoglobin</td>
<td>14.366±1.00</td>
<td>14.766±0.874</td>
<td>0.38</td>
</tr>
<tr>
<td>Total Cholesterol</td>
<td>179.66±6.819</td>
<td>173.11±8.237</td>
<td>0.09</td>
</tr>
<tr>
<td>LDL-Cholesterol</td>
<td>106.95±7.185</td>
<td>98.53±8.889</td>
<td>0.03*</td>
</tr>
<tr>
<td>HDL-Cholesterol</td>
<td>44.11±3.333</td>
<td>46.22±3.70</td>
<td>0.22</td>
</tr>
<tr>
<td>Triglycerides</td>
<td>146.22±5.517</td>
<td>146.00±11.543</td>
<td>0.96</td>
</tr>
</tbody>
</table>

* indicates p<0.05

Degree of freedom = 16

LDL=Low density lipoprotein
HDL=High density lipoprotein

Haemoglobin
The Mean and Standard Deviation of the variable Haemoglobin (Hb) of Kayaking and Rowing groups were 14.366±1.00 and 14.766±0.874 respectively. The results of t-test (t=0.902, p>0.05) depicts that differences between the two groups were insignificant.

Total cholesterol (TC)
The Mean and Standard Deviation of the variable Total Cholesterol of Kayaking and Rowing groups were 179.66±6.819 and 173.11±8.237 respectively. The results of t-test (t=1.83, p>0.05) shows that no significant difference exist between the both groups.

Low Density Lipoprotein Cholesterol (LDL-Cholesterol)
The Mean and Standard Deviation of variable Low Density Lipoprotein Cholesterol (LDL-Cholesterol) of Kayaking and Rowing groups were 106.95±7.185 and 98.53±1.715 respectively. The results of t-test (t=2.21, p<0.05) shows that the differences between the Kayakers and Rowers were significant.

High Density Lipoprotein Cholesterol (HDL-Cholesterol)
The Mean and Standard Deviation of the variable High Density Lipoprotein Cholesterol (HDL-Cholesterol) of Kayaking and Rowing groups were 44.11±3.333 and 46.22±3.70 respectively. The obtained values of t-test (t=1.27, p>0.05) indicate that differences between the two groups not significant.

Triglycerides (TG)
The Mean and Standard Deviation of the variable Triglycerides (TG) Kayaking and Rowing groups were 146.22±5.517 and 146.00±11.543 respectively. The statistical comparisons (t=0.052 p>0.05) uncover that both groups did not differ significantly.
The aim of this study was to investigate the Biochemical parameters of Kayaking and Rowing paddlers. Both Kayaking and Rowing are paddling sport that demand tremendous aerobic fitness. Earlier research has highlighted the importance of physical training and exercise duration in the variation of blood cells (Shivalingaiah et al, 2015). The concentration of Haemoglobin in both Kayakers and Rowers were found optimal and do not exhibit any significant difference between the both groups. The findings obtained after testing the Haemoglobin are comparable to the outcomes on runners (Shivalingaiah et al, 2015). Higher levels of Haemoglobin have been associated with higher performance in aerobic sports as oxygen delivery is found to be increased in aerobic athletes with the increase in total Haemoglobin (Schumacher et al, 2001; Kratz et al, 2002; Fallon, 2004). It has been well established that consistency in aerobic exercise decreases the total cholesterol, LDL cholesterol, triglycerides and increases HDL-cholesterol levels (Lemura et al, 2000). This study confirmed this fact as Rowers and Kayakers have optimal level of total cholesterol, LDL cholesterol, triglycerides and increases HDL-cholesterol. Comparatively, Rowers possess lower values of total cholesterol, LDL cholesterol, triglycerides and higher level of HDL-cholesterol than Kayakers, however, the differences were significant only in LDL cholesterol. These findings are supporting a previous study which found that engagement in aerobic activities may reduce the concentration of triglycerides and increase HDL-cholesterol (Lemura et al, 2000). The significant higher concentration of LDL-cholesterol in Kayakers are in agreement with the results of previous studies which found that aerobic exercise could make inconsistent and trivial changes on LDL-cholesterol (Lemura et al, 2000; Nybo et al, 2010; Kraus et al, 2002; O’Donovan et al, 2005). Even though the mechanism of changes in lipid profile brought up by exercise is imprecise, aerobic activity itself may raise blood lipid depletion henceforth to drop lipids concentration (Earnest et al, 2013).

VI. Conclusions

- Both Kayakers and Rowers possess optimal Biochemistry profile.
- Rowers have significantly less concentration of LDL-cholesterol than Kayakers.
- No significant differences were found between both groups on the variable Haemoglobin, Total Cholesterol (TC) High Density Lipoprotein Cholesterol (HDL-Cholesterol) and Triglycerides (TG).

Figure 1: Graphical representation of means of Biochemical Parameters of Kayaking and Rowing paddlers

V. Discussion

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