

# MINIMUM MUSCULAR FITNESS OF SECONDARY LEVEL STUDENTS

*Bhatt Mahesh Datt Tara Datt*\*

## ABSTRACT

*This paper deals with the minimum muscular fitness of secondary level students of Birendranagar Municipality of Surkhet of Nepal. Two hundred fifty five secondary level students were tested with Kraus-Weber tests for their minimum muscular fitness. The age of the students was thirteen to eighteen years. The results revealed that 71.03 percent boys and 62.73 percent girls had minimum muscular fitness. Among the tested subjects 35.94 percent Bhraman-Chhetri, 25.86 percent Janajati and 31.89 percent Dalit did not have the minimum muscular fitness. Weakness plays a significant role than the flexibility not to gain minimum muscular fitness to the subjects.*

**Key Words:** Minimum muscular fitness, Secondary level students, Kraus-Weber tests, Flexibility failure, Weakness failure.

## INTRODUCTION

Health is the state of being a quality of life (Green and Morton, 1984). Physical fitness is prerequisite for becoming healthy. Physical fitness includes the elements like strength, muscular endurance, cardio-respiratory endurance, flexibility and freedom from obesity (Johnson and Nelson, 1988). Physical fitness helps an individual to discharge his/her mental, social and physical tasks effectively and enjoyably.

Muscular fitness is a key component of physical fitness. Muscular fitness indicates two different things including a person has more powerful muscles so that s/he has the ability to lift heavy loads or she/he has more strength and stamina to do work for a longer period of time without getting tired. Physical fitness is an ability to perform a specific function or adaptability to cope up with various situations. Without minimum muscular fitness, no one can gain physical fitness. Minimum muscular fitness is the capacity of muscles or muscle groups to perform strength and endurance for certain time and flexibility for an angle (Mathews, 1987). Minimum muscular fitness is the level of strength and flexibility of particular muscle which is necessary to accomplish the functions of daily life in a satisfactory way. If the level of muscular fitness is below then the health of an individual seems to be in danger. Minimum muscular fitness plays a significant role to perform running, jumping,

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\* Mr. Bhatta is Lecturer in Physical Education at Surkhet Campus (Education), Tribhuvan University, Surkhet, Nepal.

skipping, lifting own weight as well as motor skills and ability but poor indicates dangerous, weak and deficiency (Kraus and Weber as cited in Mathews, 1987). The purpose of this study was to highlight the situation of minimum muscular fitness of secondary level students, identify muscular condition of tests failure and compare the situation of minimum muscular fitness of the students on the basis of gender and caste.

## **METHODS**

This study was conducted on students of grade nine and ten of public secondary level schools of Birendranagar Municipality of Surkhet district of Nepal in 2015. Voluntarily sampling method was adopted to select the subjects. The subjects included in this study were 255 (145 boys and 110 girls). The Kraus-Weber tests were administered to the students in their schools to mark their minimum muscular fitness. The students were shown how to do each test correctly before they were asked to perform the same to confirm their capacity on the performance. Tests items of Kraus-Weber tests were carried out one by one and record of every student was kept individually. Collected data were tabulated on the basis of pass and fail grading were and analyzed by using percentage while  $\chi^2$ -test (Chi-square test) was adopted to make comparison.

### **Test 1**

**Designation:** Abdominal Plus psoas or "A+"

**Purpose:** To measure the strength of abdominal and psoas muscles

**Procedure of test administration:** The testing subjects (student) was supine with legs straight together and keeping hands behind neck on table and the researcher holds the subject's feet down and commands "try to roll up into a sitting position"

**Scoring:** If the student being tested cannot raise his/her shoulder from the table, the mark is zero. If researcher helps the student half way to the sitting position, the mark is 10. The student who is able to score 10 marks is considered as pass and otherwise fail.

### **Test 2**

**Designation:** Abdominal minus psoas or "A-"

**Purpose:** Measure the minimum strength of abdominal muscles

**Procedure of test administration:** The student is supine with hands clasped behind the neck and knees bent. The researcher holds the subject's feet down and command "try to roll up into a sitting position"

**Scoring:** If the student being tested cannot raise his/her shoulders from the table, mark is zero. If the researcher helps the students half way to the sitting position, the student scores 5 and if unaided, the students is able to

reach a sitting position, the mark is 10. The student who is able to score 10 marks is considered as pass and otherwise fail.

### Test 3

**Designation:** Psoas or "P"

**Purpose:** Test the strength of psoas and lower abdominal muscles

**Procedure of test administration:** The student is supine with legs extended and clasping the hands behind the neck. The researcher commanded the students to "keep the knees straight and lift your feet 10 inches off table and keep them there for 10 seconds"

**Scoring:** Holding for ten full seconds is passing and is marked 10. Anything less recorded as the part of the ten seconds was held.

### Test 4

**Designation:** Upper back or "UB"

**Purpose:** Test the minimum strength of upper and back muscles

**Procedure of test administration:** The subject is prone with pillow under his/her abdomen. The researcher holds the feet and presses on hip down to the table and the subject clasps hands behind the neck. The researcher commands to raise his/her head, chest and shoulder and hold this position up to 10 seconds.

**Scoring:** Holding for full 10 seconds is passing and marked 10. Anything less recorded as the part of the ten seconds was held.

### Test 5

**Designation:** Lower back or "LB"

**Purpose:** Test the strength of lower back muscles

**Procedure of test administration:** The subject prone over the pillow and places hands down the table and rests the head on them. The researcher hold down the trunk of subject and commands to lift his/her legs up without bending on knee and hold the position for ten seconds.

**Scoring:** Holding for 10 full seconds is passing and it scores as 10. Anything less recorded as the part of the ten seconds was held.

### Test 6

**Designation:** Back and hamstring or "BH"

**Purpose:** Test the length of back and hamstring muscles

**Procedure of test administration:** The subjects stand erect in stoking or bear feet putting together with hands at side. The researcher commands then to "keep their knees straight, then lean down slowly and see how close they can come to touching the table with their finger tips and hold the position for three seconds without bouncing.

**Scoring:** If the subject is able to touch the table and hold the position for three seconds is considered as pass and designated by T. Less than touch is marked by the distance in inches between table and finger tips with minus sign.

## RESULTS

### AGE OF THE STUDENTS

All the subjects in this study belonged to grade nine and ten. Table-1 shows the age of subjects participated in the test.

**Table-1:** Age of the Students

Age at years	Number	Percentage
13 years	37	14.51
14 years	72	28.24
15 years	73	28.63
16 years	73	28.63
<b>Total:</b>	<b>255</b>	<b>100.00</b>

The data shows that 14.51 percent and 28.24 percent students were the age of 13 and 14 years respectively. Similarly, 28.63 and 28.63 students belonged to age of 15 and 16 years and above respectively.

### CONDITION OF MINIMUM MUSCULAR FITNESS

Subjects who passed all the tests items of Kraus-Weber tests successfully considered pass and declared as s/he has got minimum muscular fitness, while anyone failing in even one test item was considered as failure and resulting not having minimum muscular fitness. Table-2 shows the condition of minimum muscular fitness of subjects.

**Table-2:** Condition of Minimum Muscular Fitness

Description	Number	Percentage
Pass	172	67.45
Fail	83	32.55
<b>Total:</b>	<b>255</b>	<b>100.00</b>

The above table reveals the fact that, out of 255, only 67.45 percent students had minimum muscular fitness while 32.45 percent did not qualify that.

### GENDER WISE MINIMUM MUSCULAR FITNESS

Table-3 presents the gender wise minimum muscular fitness. It shows that 71.03 percent boys and 62.75 percent girls had minimum muscular fitness.

**Table-3:** Gender wise Condition of Minimum Muscular Fitness

Results	Boys	Girls	Total
Pass	103 (71.03)	69 (62.79)	172 (67.45)
Fail	42 (28.97)	41 (37.27)	83 (32.55)
<b>Total:</b>	<b>145 (100)</b>	<b>110 (100)</b>	<b>255 (100)</b>

*Note:* The number inside the parenthesis indicates percentage.

**CASTE WISE MINIMUM MUSCULAR FITNESS**

All the subjects were classified into three castes like Bhraman-Chhetri, *Janajati* and *Dalit*. Caste wise minimum muscular fitness of the students is presented in Table-4.

**Table-4:** Caste wise Minimum Muscular Fitness

Caste	Pass	Fail	Total
Brahman-Chhetri	82 (64.06)	46 (35.94)	128 (100)
<i>Janajati</i>	43 (74.14)	15 (25.86)	58 (100)
<i>Dalit</i>	47 (68.11)	22 (31.89)	69 (100)

*Note:* The number inside the parenthesis indicates percentage.

It is found that 64.06 percent Bhraman-Chhetri, 74.14 percent *Janajati* and 68.11 percent *Dalit* students had minimum muscular fitness.

**MINIMUM MUSCULAR FITNESS OF TESTED MUSCLES**

Strength and flexibility of six muscles of trunk portion of body of students were tested and result is presented in Table-5.

**Table-5:** Minimum Muscular Fitness of Tested Muscles

Name of the muscles and test	Pass	Fail	Total
Abdominal plus psoas muscles or "A+"	185 (72.54)	70 (27.46)	255 (100)
Abdominal minus psoas muscles or "A-"	216 (84.70)	39 (15.30)	255 (100)
Psoas muscles or "P"	186 (72.94)	69 (27.06)	255 (100)
Upper back muscles "UB"	217 (85.09)	38 (14.19)	255 (100)
Lower back muscles "LB"	211 (82.74)	44 (17.26)	255 (100)
Back and hamstring muscles "BH"	206 (80.78)	49 (19.12)	255 (100)

*Note:* The number inside the parenthesis indicates percentage.

The above table shows that, 72.54 percent respondents' abdominal plus psoas muscle and 84.70 percent respondents' abdominal minus psoas muscle have got minimum muscular fitness. Similarly, 72.54 percent respondents' psoas muscle, 85.09 percent respondents' upper back muscle, 82.74 percent respondents' lower back muscle and 80.78 percent back and hamstring muscle have got minimum muscular fitness. It also indicates

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that the condition of abdominal plus muscle and psoas muscle is comparatively poor than other tested muscles.

#### MUSCULAR CONDITION OF TEST FAILURE

The subjects who were unable to demonstrate the commanded range of movement were considered as flexibility failure where as the subjects who could not hold the commanded position for full seconds were considered as weakness failure. The Table-6 shows the condition muscle of test failure.

**Table-6:** Muscular Condition of Test Failures

Tests	Boys			Girls		
	Weakness failures	Flexibility failures	Total	Weakness failures	Flexibility failures	Total
Abdominal plus psoas muscles or "A+"	26 (72.22)	10 (27.78)	36 (100)	18 (52.94)	16 (47.06)	34 (100)
Abdominal minus psoas muscles or "A-"	18 (100)	-	18 (100)	16 (76.19)	5 (23.81)	21 (100)
Psoas muscles or "p"	36 (100)	-	36 (100)	31 (96.32)	2 (3.68)	33 (100)
Upper back muscles "UB"	21 (100)	-	21 (100)	17 (100)	-	17 (100)
Lower back muscles "LB"	22 (100)	-	22 (100)	22 (100)	-	22 (100)
Back and hamstring muscles "BH"	-	24 (100)	24 (100)	-	25 (100)	25 (100)

**Note:** The number inside the parenthesis indicates percentage.

Table-6 describes the analysis of test failures. It indicates that weakness and poor flexibility play a vital role to fail the girl students in test while weakness in the boys except the back and hamstring muscle test is the cause of their failure.

#### GENDER AND CASTE WISE COMPARISON OF MINIMUM MUSCULAR FITNESS

Comparison of minimum muscular fitness of the subjects was made on the basis of their gender and caste which is presented in Table-7. It indicates that there is no significant difference meaning in the minimum muscular fitness in terms of gender and caste.

**Table-7:** Comparison of Gender and Caste wise Minimum Muscular Fitness

Description		Results of the tests			df	Calculated Value	Tabulated Value	Conclusion
		Pass	Fail	Total				
Gender	Boys	103	42	135	1	2.763	3.841	Non significant
	Girls	69	41	410				
	Total	172	83	255				
Caste	Brahmin-Chhetri	82	46	128	2	1.260	5.991	Non significant
	Janjati	43	15	58				
	Dalit	47	22	69				
	<b>Total:</b>	<b>172</b>	<b>83</b>	<b>255</b>				

## DISCUSSION

### MINIMUM MUSCULAR FITNESS

Out of 255 (67.45 percent) students pass all six tests items successfully. Earlier work of Kraus and Hirschland (1954) shows that 43.40 percent American children pass all tests successfully but, in India 71.25 percent subjects passed those tests items successfully (Kulkarni and *et. al.*, 2010).

### MUSCULAR CONDITION OF THE FAILURE

Overall failure percentage in this study was observed to be 32.55 percent (out of 255). The early work of Kraus and Hirschland (1954) shows that 56.60 percent of 4,458 American children failed one or more tests. While Gharote and Ganguly (1975) reported that failure percentage was 40.30 in school children in India.

### GENDER WISE MINIMUM MUSCULAR FITNESS

In this study failure percentage of boys was 20.97 and of girl was 37.27 percent. It these data compare with earlier facts presented by Kulkarni and associates (2010) 21.25 percent boys and 36.25 percent girls failed. It can be concluded that there is slight similarities in both studies. The comparison of minimum muscular fitness of the subjects was made by gender using  $\chi^2$  test and it indicate that there is no significant difference among the subjects.

### CASTE WISE MINIMUM MUSCULAR FITNESS

The total subjects of this study were 255. Out of them 50.20 percent were Bhraman-Chhetri, 22.74 percent *Janajati* and 27.06 percent *Dalit*. The pass percentage of *Janajati* was found the highest (74.13 percent) and followed by *Dalits* (68.11 percent). The comparison of minimum muscular fitness of subjects by caste was made by using  $\chi^2$  test and no significant difference was found.

## CONCLUSION

More than one fourth of the students have not got minimum muscular fitness. Thus, it indicates that future manpower of nation will be in danger. So, it is recommended that government should formulate policy and programs regarding physical fitness training, sports and extracurricular activities and they should be organized in schools regularly.

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