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Analyses the Average Pressure on Left Foot and Right Foot among the Rural and Urban Primary School Students of Haryana

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Abstract – Foot structure has a long established connection to foot function within the research field. For this study random sampling technique has been used for the collection of data. The researcher has selected total 1500 individuals as subjects (750 rural students and 750 urban students measured the Static Planter Foot Pressure (PFP) and Body Mass Index (BMI) The subjects were asked to stand on BTS P – Walk modular system (Pressure plate) and the data was recorded for 5 seconds. The F value was found to be 0.798, which is not found significant even at (P<0.05) level. Rural and Urban students were bearing almost equal Average pressure on their left foot. The F value was found to be 10.844, which is more than the table value at (P<0.01) level. The t value was 6.32 for Rural and Urban underweight (BMI <18.5) is significant at (P<0.01) level. Mean value 32.68 of rural underweight students is more than the mean value 27.59 of Urban underweight. The results of the study reveal that no statistical differences were found between rural and urban primary school students of Haryana

Keywords: Average Pressure (AP), Underweight (UW), Normal Weight (NW), Overweight (OW), Obese, Platykurtic, Leptokurtic

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1. INTRODUCTION

Sport biomechanics is branch of science which studies the forces and their effect on living systems. It studies about forces and their effects on humans who are involved in various physical activities. McGinnis P M. (2005) Biomechanics is a relatively new term that became popular only in the 1960s. Biomechanical studies of human movements were reported throughout the 20th century. In the late 1960s and early 1970s, the beginning and common use of electronic digital computers made biomechanical research more possible throughout the 1970s and 1980s. Davison and Williams (2009) Sport and exercise biomechanics is concerned primarily with that subdivision of technicalities called rigid body workings. Statics and dynamics are the subdivisions of rigid-body mechanics. Kinematics and kinetics is additional subdivision of dynamics. The role of science and technology in sports are becoming very important.

Hawrylak A at el. (2018) evaluated the static and dynamic plantar pressure division in amateur marathon runners. Static and dynamic plantar pressure profiles of amateur marathon runners with sedentary cohorts. Are there differences in the plantar pressures of these two populations? Is there a correlation between body mass and BMI with plantar loading? The study involved 43 runners involved in marathon training and 30 age-matched untrained individuals. Plantar pressures were measured using a baropodometric system. The marathon runners showed greater forefoot plantar pressure of the dominant extremity in the static condition and reduced medial plantar pressure of both extremities in the dynamic condition. Correlations were observed between body mass and BMI with mean plantar pressure only in the marathon group and only for the dominant extremity in the dynamic condition. Marathon training may modify the forefoot plantar loading characteristics of the dominant extremity during static conditions and increase lateral plantar pressure of both extremities in a dynamic (gait) condition.

2. METHOD AND PROCEDURE

For this study random sampling technique has been used for the collection of data. The researcher has selected a total 1500 individuals as subjects (750 rural students and 750 urban student measured the Static Planter Foot Pressure (PFP)

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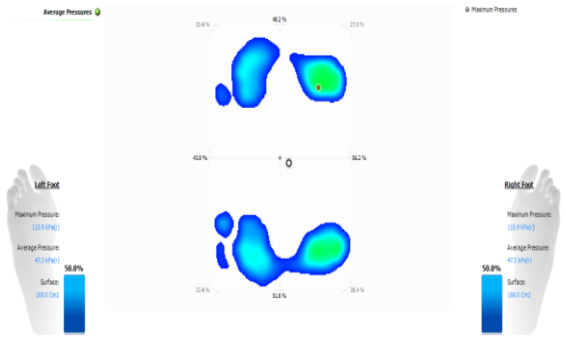
and Body Mass Index (BMI). The subjects of rural students category were who studied in rural Govt. school of Haryana and remaining 750 were urban students category were who studied in urban school of Haryana. The age of all the subjects selected for the present study between 10 to 12 years in all categories. RURAL AND URBAN UNDER WEIGHT (UW) (< 18.5) (1096), RURAL AND URBAN NORMAL WEIGHT (NW) (18.5-24.9) (330), RURAL AND URBAN OVERWEIGHT (OW) (25-29.9) (65), RURAL AND URBAN OBESE (30-34.9) (09).

3. TOOLS USED



Picture 1

Picture 1.1 showed BTS G Studio software analyses the average pressure

Picture 1.2 & Pictures 1.2

Picture 1.1 showed BTS P-WALK measured the average pressure

3. DATA ANALYSIS AND RESULTS

Table 1

Shown the Average Pressure (KPa (r) on Left foot Right foot of various categories of primary school students

S. NO.	Categories	N	Left & Right foot	Mean	S.D	Kurtosis	Skewness
1.	Rural U.W (below 18.5) Urban U.W	674	Lf	18.51	6.88	0.17	0.36
			Rf	32.68	14.61	-0.17	0.54
		422	Lf	17.67	8.80	38.16	3.79
			Rf	27.59	9.80	0.12	0.61
2.	Rural N.W (18.5-24.9) Urban N.W (18.5-24.9)	65	Lf	20.71	7.47	-0.09	0.19
			Rf	32.19	14.15	0.59	0.75
		265	Lf	18.70	13.05	142.30	10.29
			Rf	29.08	11.47	0.14	0.80
3.	Rural O.W (25-29.9) Urban O.W (25-29.9)	11	Lf	18.8	7.50	1.64	1.03
			Rf	26.18	12.45	-1.05	0.66
		54	Lf	17.54	6.73	0.74	0.63
			Rf	29.08	11.47	0.14	0.80
4.	Rural Obese (30-34.9) Urban Obese (30-34.9)	00	Lf	0	0	0	0
			Rf	0	0	0	0
		09	Lf	24.71	7.72	1.55	-1.21
			Rf	32.51	8.52	-0.95	0.59

Table, 1(1) the left foot mean of Average Pressure (KPa (r) of Rural and Urban UW primary school students were found 18.51 ± 6.88 and 17.67 ± 8.80. Range of standard error of Skewness of Rural N=674 is -0.188 to + 0.188 and Urban N=422 is -0.238 to + 0.238. The value of Rural Skewness= 0.36, is more the range. The value of Kurtosis= 0.17, is less than 0.263 that showed that the division of data is Platykurtic. But, the division of data is Leptokurtic as seen the value of Skewness Urban are 3.79, is more the range. Same, the value of Kurtosis= 38.16, is more 0.263. The right foot means of Average Pressure (AP) of Rural and Urban UW primary school students were 32.68 ± 14.61 and 27.59 ± 9.80. The value of Skewness Rural and Urban primary school students is 0.54 and 0.61, is more the range. Same the value of Kurtosis= -0.17 and 0.12, is less than 0.263. Therefore, the division of data is Platykurtic in both the cases.

Table, 1(2) showed the Average Pressure (AP) (KPa (r) on left foot of Rural and Urban NW. The mean of Average Pressure (AP) (KPa (r) of Rural and Urban NW primary school students were 20.71 ± 7.47 and 18.70 ± 13.05. Range of standard error of Skewness of Rural N=65 is -0.607 to +0.607 and Urban N=265 is -0.300 to +0.300. The division of data showed Platykurtic the value of Rural Skewness= 0.19, is less than the range and the value of Kurtosis= -0.09, is less than 0.263, while the division of data is Leptokurtic Urban seen Skewness value is 10.29, is more the range. Same, the value of Kurtosis= 142.30, is more 0.263. Right feet mean were 32.19 ± 14.15 and 29.08 ± 11.47. The value of Skewness Rural primary school students is 0.75, is more the range. The value of Kurtosis= 0.59, is more 0.263, so the division of data is Leptokurtic. But, the value of Urban Skewness= 0.80, is more the range. Same,

the value of Kurtosis= 0.14, is less than 0.263, so the division of data is Platykurtic.

Table, 1(3) showed the Average Pressure (AP) (KPa (r) on left foot of Rural and Urban overweight primary school students (BMI 25-29.9). The mean of Average Pressure (AP) (KPa (r) of Rural and Urban overweight primary school students were 18.8 ± 7.50 and 17.54 ± 6.63. Range of standard error of Skewness of Rural N=11 is -1.477 to +1.477 and Urban N=54 is -0.666 to 0.666.The division of data is Leptokurtic both Rural and Urban overweight primary school students as seen value of Rural Skewness= 1.03 is less than the range. The value of Kurtosis= 1.64, is more 0.263; the value of Urban Skewness= 0.63, is less than the range. Same, the value of Kurtosis= 0.74, is more 0.263. Right foot mean of Average Pressure (AP) of Rural and Urban Overweight students (BMI 25-29.9) were 26.18 ± 12.45 and 26.09 ± 9.21. The value of Rural primary school students Skewness=0.66, is less than the range. Same is urban primary school students is 1.25.The value of Kurtosis= -1.05 Rural primary school students, is less than 0.263, But, the value of Kurtosis= 1.75 Urban primary school students, is more 0.263. Therefore, the division of data is Platykurtic (Rural) and LPT (Urban).

Table, 1(4) the left foot mean of Average Pressure (AP) (KPa (r) of Rural and Urban Obese students were 00 ± 00 and 24.7 ± 7.72. Range of standard error of Skewness of Rural N=00 is 00 to 00 and Urban N=09 is -1.632 to +1.632.The division of data is Platykurtic Rural But, the division of data is Leptokurtic Urban as seen the value of Skewness and Kurtosis 00, is less and value of Urban Skewness= -1.21 this is between the ranges. Similarly, value of Kurtosis= 1.55, is more 0.263. The right foot mean of Average Pressure (AP) of Rural and Urban Obese (BMI 30-34.9) were 00 ± 00 and 32.51 ± 8.52. Range of standard error of Skewness of Rural N=00 is 00 to 00 and Urban N=09 is -1.632 to +1.632. The value of Rural Skewness= 00 and Urban are 0.59, is less than the range. The value of Kurtosis 00 and -0.95 is also less than 0.263 that showed that the division of data is Platykurtic both (Rural and Urban).

Table 2

Analysis of Variance (ANOVA) Average Pressure measured in (KPa (r) on Left foot of various categories of primary school students

Source of Variance	SS	Df	MSV	F value	P
Between Groups	1142.78	5	228.56	0.798	0.551
Within Groups	425398.39	1485	286.46		
Total	426541.18	1490			

In Table 2, the Average Pressure (AP) measured in (KPa (r) on Left foot various categories of primary school students has been assessed. The F value is found to be 0.798, is not found significant even at 0.05 levels that indicates that there exists no significant difference among the categories of primary school students Average Pressure on Left foot. Hence it is concluded that the Rural and Urban were bearing almost equal Average pressure on their left foot.

Table 3

Analysis of variance (ANOVA) Average Pressure measured in (KPa (r) on Right foot of various categories of primary school students

SV	SS	Df	MSV	F value	P	T- value
Between Groups	8677.69	5	1735.54	10.844**	(P<0.01)	6.32**
Within Groups	237659.23	1485	160.04			1.87
Total	246336.92	1490				0.03

**- significant at 0.01% level (P <0.01)

Interpretation of table 3: the Average Pressure (AP) (KPa (r) on right foot of various categories has assessed. The F value is found to be 10.844, is more the table value at 0.01 levels meaning thereby, there exists significant difference within and between the categories of students Average Pressure (AP) (KPa (r) on right foot. Further to find out the degree and direction of difference Average Pressure (KPa (r) on right foot between various categories T- Test were applied.

The t value is 6.32 Rural and Urban UW is found to be significant at 0.01 levels. That indicated the students differ in this category Average Pressure measured in (KPa (r) on Right foot. The table 4.9(1) showed that mean value 32.68 of Rural UW students is more the mean value 27.59 of Urban UW students Average Pressure on Right foot. Therefore it is concluded that the rural UW were bearing significantly more pressure on their right foot in comparison to their urban counterparts. Therefore no abnormal division of pressure due to body mass have been observed in these categories; (Rural and Urban NW students, Rural and Urban overweight students although the mean values are comparable in these categories. Rural and Urban Obese students the t- value is not as no Rural has been found in obese category. Therefore it is concluded that the Rural and Urban of NW, Overweight and obese categories were bearing almost same pressure on their right foot.

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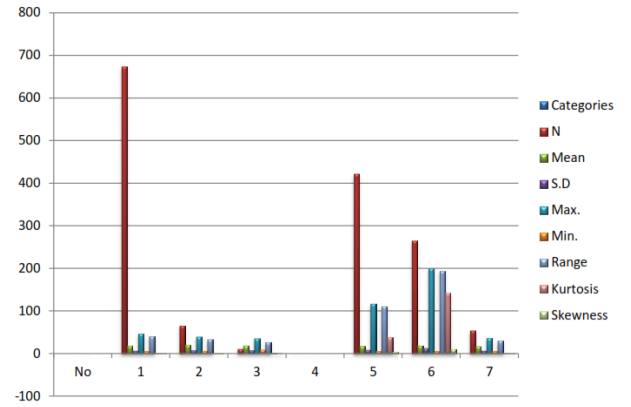

Diagram 1.1

Diagram 1.1 showing rural and urban left foot average pressure

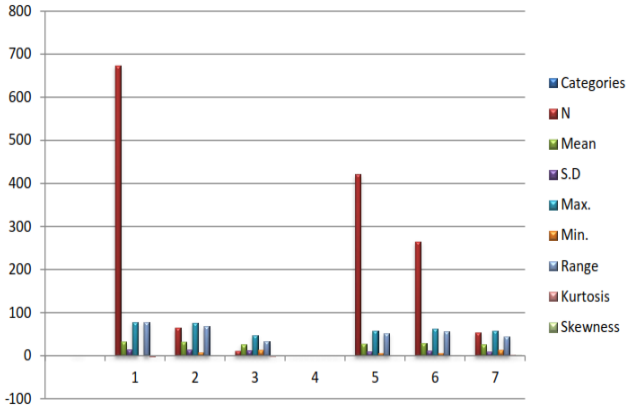

Diagram 1.2

Diagram 1.1 showing rural and urban right foot average pressure

4. DISCUSSION

The results of average pressure showed that the rural and urban students were bearing almost equal average pressure on their left foot because the calculated F value (0.798) was not significant. Whereas a significant difference in the rural and urban underweight subjects as the F value was 10.844 which was more than the table value at 0.01 levels of confidence. Similarly, it can be seen that the t value is 6.32 for Rural and Urban underweight was found to be significant at 0.01 level of confidence.

5. CONCLUSION

The F value was found to be 0.798, which is not found significant even at (P<0.05) level. Rural and Urban students were bearing almost equal Average pressure on their left foot. The F value was found to be 10.844, which is more than the table value at (P<0.01) level. The t value was 6.32 for Rural and Urban underweight (BMI <18.5) is significant at (P<0.01) level. Mean value 32.68 of rural underweight students is more than the mean value 27.59 of Urban underweight. The rural underweight students were bearing significantly more pressure on their right foot in comparison to their urban counterparts.

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