ANALYSIS OF SELECTED ANTHROPOMETRIC VARIABLES BETWEEN MONGOLOID AND DRAVIDIAN MEN COLLEGE STUDENTS

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Abstract

The purpose of the present study was to analyse the selected anthropometric variables among Mongoloid and Dravidian men college students from the northeastern (Manipur) and southern (Tamil Nadu) regions of India between the ages of 18 and 23 among a total of 600 college students. The men college students are classified into three age groups, such as 18-19 years, 20-21 years, and 22-23 years old. The objectives of the study are to assess the difference between Mongoloid and Dravidian men college students as well as the effect of race and age on selected anthropometric variables such as body weight, standing height, forearm circumference, and calf circumference. A two-way (2x3) analysis of variance (ANOVA) was used to estimate the variations in anthropometric variables concerning their human race with age groups. The simple effect and the least significant difference (LSD) post hoc test were applied to determine the effect and the pairwise mean difference at the 0.05 level. The result showed that there was a significant difference in body weight, sanding height, forearm circumference, and calf circumference between Mongoloid and Dravidian men college students, irrespective of age. Further, there was a significant difference in body weight, standing height, forearm circumference, and calf circumference among different age groups, irrespective of race. Also, there was an interaction between race and age in forearm circumference, but no interaction was found between race and age in weight, standing height, and calf circumference. The variation found in physical characteristics or anthropometry among Mongoloid and Dravidian men is due to many factors such as heredity, geographical structure, and environment. The factors of nutrition, disease, socioeconomic status, urbanisation, physical activity, climate, and psychosocial deprivation all contribute to the growth of body dimensions.

Keywords: Race, Age, Mongoloid, Dravidian, Weight, Height, Forearm Circumference and Calf Circumference.

Introduction

A race may be defined as the classification of humanity into groups of people that have similar physical traits and appearances that are adequate to identify them as a certain type of human being and that can be passed down through generations. They listed 30 different living races and combined these into six larger units they called “racial stocks”: Negroid, Mongoloid, White, Australoid, American Indian, and Polynesian. The races in this classification were defined based on different sets of physical characteristics (Anemone, R. L. 2018). Anthropologists define race as a principal division of mankind, marked by physical characteristics that breed. Race is a biological concept. The term race should not be used in connection with those groupings of mankind such as nation, religion, community, and language, which depend on the feelings, ideas, or habits of people and can be changed by the conscious wishes of the individual. According to UNESCO, in the classification of the human race, the definitions related to race strike a note of discord, and there is no opinion expressed in them. Fundamentally, the entire human species has one origin, and all men are Hom sapiens. National, religious, geographical, cultural, and linguistic groups are entirely unconnected with and unrelated to race. These groups do not indicate any race. The concept of race ought not to be associated with the various classifications of

humanity, such as nationality, religion, community, and language, which are contingent upon the sentiments, beliefs, or practices of individuals and can be altered through the deliberate intentions of the person. The differences that exist between the physical characteristics of men are due to both heredity and environment. Genetics has been defined as the scientific study of heredity. Genetic variation is important not only in evolution but also in all areas where genetics is involved (Ewens W.J., 2001). Some races may claim purity, but this is not true. Today, pure races cannot be found anywhere in the world. This investment in race—not as pure types but as origins and mixed lineages—is inseparable from the history of anthropology and statistics in the South Asia subcontinent (Sayori Ghoshal 2020). The process of mixing races originated long ago. It is possible that in one nation the degree of racial difference may be greater while in another nation it is lesser. Furthermore, the idea that racial mixing is deleterious is fundamentally false and unfounded from a biological perspective. In this way, the race is a group of intermarried individuals, born to common ancestors that possess similar physical traits and a 'we feeling'. In short, it may be stated that race is a group of intermarrying individuals who are born of common ancestors and possess' similar physical characteristics and primarily heritable physical differences from other human populations.

Mongoloid people

Mongoloids have probably originated in the Central part of Asia and moved in different directions. They are mainly divided into four sub-divisions based on their geographical distribution. These sub-divisions are: a) Classical Mongoloid; b) The Archaic of Eskimo c) Indonesian-Malay Mongoloid, and d) The American Indian, or the Amerindian. The important characteristic features of the Mongoloid race are as follows: Yellow or yellowish-brown skin colour; straight head hair; scanty body and facial hair; brachycephalic head; low nasal root and nasal bridge; concave or straight nasal profile; broad and flat face with prominent cheekbones; obliquely set eyes with a narrow silt-like opening; characteristic epicanthic eye fold; and stature is variable. A person from East Asia, Southeast Asia, the Arctic, the Americas, the Pacific Islands, or Finland was referred to as a mongoloid. The group of this person is called the mongoloid race. People of this type are found along the Himalayan region, especially in the regions namely North East Frontier, Nepal, and Burma (Ali, E., & Ali, M. E., 2019). The population of North East India is dominated by mongoloid elements.

Dravidian/ Indo-Dravidian people

Native speakers of languages in the Dravidian language family are referred to as Dravidian peoples. Populations of Dravidian speakers live mainly in southern India, most notably Five major Dravidian ethnic groups in India are Tamil, Kannada, Malayalam, Telugu, Tulu, and other sub-groups who speak Dravidian language. Dravidian people are native speakers of the Dravidian languages in the Indian Subcontinent. The Dravidian language has been identified as one of the major language groups in the world, with Dravidian peoples dwelling in parts of central India, Sri Lanka, Bangladesh, Pakistan, southern Iran, south Afghanistan, etc. Across the globe, there are about 245 million inherent speakers of Dravidian languages. They constitute the foremost part of the South Indian population. Dark brown eyes, a dolichocephalic head, a lot of black wavy hair, and a light to dark brown complexion are important physical traits of the Indo-Dravidian race. Their faces are medium to narrow, and they don't prognate much. Their nasal bridge is high with depressed roots. Stature is medium. The people of this region speak Dravidian languages except those from Karnataka who speak Konkani and the Todas of Nilgiri Hills who speak their distinct languages.

Human Anthropometry

For the study, one of the most important tasks for physical educationists is to measure different parts and components of the human body. Anthropometry (derived from the Greek Anthropos: human and Metron: measure) refers to the systematic measurement of the physical characteristics of the human body, primarily body weight, body size, and shape (Tur and Bibiloni, 2019). Anthropometry as a science, deals with the study of human measurements with a view toward the understanding of physical

variations in human population groups (Igbigbi, P. S. et al. 2018). For additional information on anthropometry, a comprehensive manual provides details for measurement procedures and standardised techniques for more than 40 anthropometric measurements.

Purpose of anthropometric study

The study of anthropology may differentiate athletes into various homogeneous or heterogeneous groups on some scientific lines with the help of testing their body structure and present fitness level. The classification may be based on sex, body size (weight and height), body skeletal diameter, circumferences, body composition, etc. It may also help to select the best few participants for various categories of sports/athletic events according to their body structure with some scientific selection criteria. Anthropometric measurements such as height, weight, skinfold thickness, and arm circumference are valuable indicators of nutritional status. It also helped in keeping records over a long period to indicate the growth rate of the individual. Anthropometric measurement can help assess malnutrition (overnutrition, undernutrition, imbalance, specific deficiency) of specific nutrients in the body, such as protein, fat, other minerals, etc.

Anthropometric variables

The selected anthropometric variables for this study were body weight, standing height, forearm circumference, and calf circumference. There are many absolute anthropometric measurements for human body parts. Apart from those studies, these variables were selected specifically to analyse the anthropometric conditions of physically active men college students.

The aim of the study is to analyse the selected anthropometric variables between Mongoloid and Dravidian male college students. The objectives of the study are to assess the difference between Mongoloid and Dravidian male college students as well as the effect of race and age on selected anthropometric variables such as body weight, height, forearm circumference, and calf circumference.

Methodology

The purpose of the present study was to analyse the selected anthropometric variables between Mongoloid and Dravidian men college students from northeastern (Manipur) and southern (Tamil Nadu) regions of India between the ages of 18 and 23 years as registered in the college records, which are classified into three age groups (18-19, 20-21, and 22-23 years) and a minimum 30 minutes daily physical activity or exercise. To achieve the purpose of the study, the investigator selected 600 Mongoloid and Dravidian men college students as subjects from Mongoloid (300) and Dravidian (300); each area consists of 300 subjects selected by using a random sampling method. The selected anthropometric variables—weight (kg), height (cm), forearm circumference (cm), and calf circumference (cm)—were measured with the help of a weighing machine, stadiometer, and non-stretchable steel measuring tape to collect the data for analysis.

Research design and statistical techniques

For the present study, the Statistical Package of Social Sciences (SPSS) software version 22.0 was used for analysing the data on selected anthropometric variables. A two-way analysis of variance (ANOVA) (2x3) was used for estimating the variations in anthropometric variables to their human race with age groups. Whenever the obtained f-value was found statistically significant, the Simples Effect Test (SET) and the Least Significant Difference (LSD) post hoc test were applied to determine the effect and the pairwise mean difference. In all cases, the criteria for statistical significance were set at 0.05, which was considered appropriate.

Analysis

In the field of scientific research study, it must be carried out in such a way as to achieve the objectives of this study, and the scientific inferences are drawn from the study.

Body weight

Table -1
Descriptive Statistics on Body Weight between Mongoloid and Dravidian Men College Students with Respect to Age Groups

Age group		Mongoloid	Dravidian	Total
18-19yrs	**Mean**	60.51	60.71	60.61
	S.D.	4.46	3.71	4.11
20-21yrs	**Mean**	62.33	63.79	63.06
	S.D.	4.86	4.318	4.65
22- 23yrs	**Mean**	64.59	65.69	65.15
	S.D.	4.51	5.54	5.06
Total	**Mean**	62.47	63.39	62.94
	S.D.	4.89	5.02	4.97

Table 1 reflects the descriptive values of mean and standard deviations of body weight in Mongoloid and Dravidian men college students of age groups 18-19 years, 20-21years and 22-23 years.

The statistical analysis between Mongoloid and Dravidian men college students in body weight is presented in Table 2.

Table -2

Summary of ANOVA (2X3) Factorial Design on Body Weight

Tests of between-subject effects					
Dependent Variable: Height					
Source of variation	**Sum of square (ss)**	**df**	**MS**	**F**	**Sig.**
Factor A (Race)	127.789	1	127.789	6.028*	0.014
Factor B (Age)	2066.140	2	1033.070	48.735*	0.000
Interaction (Race x Age)	42.377	2	21.188	1.000	0.369
Error	12591.474	594	21.198		

** Significance at 0.05 level of confidence*

(Table values of 1 to 694 & 2 to 594 are 3.86 & 3.02 respectively)

It is clear from the above table that the body weight between Mongoloid and Dravidian from Manipur and Tamil Nadu reveals a significant difference irrespective of age, as the obtained F ratio of 6.028 is greater than the table value of 3.86 at α =0.05 for the df of 1 and 594. Further, there is a significant difference in body weight among age groups irrespective of race, as the obtained f ratio of 48.735 is greater than the table value of 3.02 for the df of 2 and 594. Moreover, there is no significant difference in body weight between the interaction of race and age, as the obtained f ratio of 1.000 is less than the required table value of 3.08 at α = 0.05 for the df of 2 and 594. Since a significant difference is found among the age groups. So, a post hoc test was applied to age groups and presented in Table 3.

Table -3

Pairwise Comparisons (Post Hoc Test LSD) of Age (both Race combined) on body weight.

18-19yrs	20-21yrs	22-23yrs	M.D.	95% CI.
60.61	63.06		2.45*	1.81
60.605		65.15	4.54*	
	63.060	65.15	2.08*	

Table 3 shows that there is a significant difference in body weight between 18-19 and 20-21 years, 18-19 and 22-23 years, and 20-21 and 22-23 years, respectively, as obtained value ($p < 0.05$).

Standing Height

Table -4

Descriptive Statistics on Standing Height between Mongoloid and Dravidian Men College Students with Respect to Age Groups

Age group		Mongoloid	Dravidian	Total
18-19yrs	**Mean**	165.39	168.01	166.70
	S.D.	3.75	4.25	4.21
20-21yrs	**Mean**	166.51	169.83	168.17
	S.D.	4.24	5.39	5.12
22- 23yrs	**Mean**	167.01	171.08	169.05
	S.D.	2.75	5.54	4.82
Total	**Mean**	166.31	169.64	167.97
	S.D.	3.68	169.64	4.82

Table 4 reflects the descriptive values of mean and standard deviations of sanding height on Mongoloid and Dravidian men college students of age groups 18-19 years, 20-21 years, and 22-23 years.

The statistical analysis between Mongoloid and Dravidian men college students in standing height is presented in Table 5.

Table -5

Summary of ANOVA (2X3) Factorial Design on Standing Height

Tests of between-subject effects					
Dependent Variable: Height					
Source of variation	**Sum of square (ss)**	**df**	**MS**	**F**	**Sig.**
Factor A(Race)	1670.002	1	1670.002	85.249*	0.000
Factor B (Age)	561.703	2	280.852	14.337*	0.000
Interaction (Race x Age)	52.583	2	26.292	1.342	0.262
Error	11636.230	594	19.590		

**Significance at 0.05 level of confidence*

(Table values of 1 to 694 & 2 to 594 are 3.86 & 3.02 respectively)

It is clear from the above table that the standing height between Mongoloid and Dravidian from Manipur and Tamil Nadu reveals a significant difference irrespective of age, as the obtained F ratio of 85.249 is greater than the table value of 3.86 at $\alpha = 0.05$ for the df of 1 and 594. Further, there is also a significant difference in height among age groups, irrespective of race, as the obtained f ratio of 14.337

is greater than the table value of 3.02 for the df of 2 and 594. Moreover, there is no significant difference in height between the interaction of race and age, as the obtained f ratio of 1.342 is less than the required table value of 3.08 at $\alpha = 0.05$ for the df of 2 and 594. Since a significant difference is found among the age groups. So, a post hoc test was applied to age groups and presented in Table 6.

Table -6

Pairwise Comparisons (Post Hoc Test LSD) of Age (both Races combined) on Standing Height

18-19yrs	20-21yrs	22-23yrs	M.D.	95% CI.
166.70	168.17		1.78*	1.74
166.70		169.05	2.35*	
	168.17	169.05	0.87*	

Table 6 shows that there is a significant difference in standing height between 18-19 and 20-21 years, 18-19 and 22-23 years, and 20-21 and 22-23 years, respectively, as obtained value ($p < 0.05$).

Forearm Circumference

Table -7

Descriptive Statistics on Forearm Circumference between Mongoloid and Dravidian Men College Students with Respect to Age Groups

Age group		Mongoloid	Dravidian	Total
18-19yrs	**Mean**	24.87	24.82	24.84
	S.D.	1.43	1.76	1.59
20-21yrs	**Mean**	25.76	25.33	25.54
	S.D.	2.01	1.33	1.71
22- 23yrs	**Mean**	26.59	25.69	26.14
	S.D.	1.99	1.52	1.83
Total	**Mean**	25.74	25.27	25.51
	S.D.	1.95	1.58	1.79

Table 8 reflects the descriptive values of mean and standard deviations of forearm circumference on mongoloid and Dravidian men college students of age groups 18-19 years, 20-21 years, and 22-23 years.

The statistical analysis between Mongoloid and Dravidian men college students in forearm circumference is presented in Table 8.

Table -8

Summary of ANOVA (2X3) Factorial Design on Forearm Circumference

Tests of between-subject effects					
Dependent Variable: calf circumference					
Source of variation	**Sum of square (ss)**	**df**	**MS**	**F**	**Sig.**
Factor A (Race)	32.063	1	32.063	11.177*	.001
Factor B (Age)	168.788	2	84.394	29.419*	.000
Interaction (Race x Age)	17.630	2	8.815	3.073*	.047
Error	1704.006	594	2.869		

** Significance at 0.05 level of confidence*

(Table values of 1 to 694 & 2 to 594 are 3.86 & 3.02 respectively)

It is clear from the above table that the forearm circumference between Mongoloid and Dravidian college students from Manipur and Tamil Nadu reveals a significant difference irrespective of age, as the obtained F ratio of 11.177 is greater than the table value of 3.86 at α = 0.05 for the df of 1 and 594. Further, there is a significant difference in calf circumference among age groups irrespective of race, as the obtained f ratio of 29.419 is greater than the table value of 3.02 for the df of 2 and 594. Moreover, there is a significant difference in calf circumference between the interaction of race and age, as the obtained f ratio of 3.073 is more than the required table value of 3.08 at α = 0.05 for the df of 2 and 594. So, a simple effect for race and age and a post hoc test are applied to age groups and presented in Table 9 and Table 10, respectively.

Table -9

Simple Effect of Race and Age on Forearm Circumference

Source of variance		**SS**	**df**	**MS**	**F**	**Sig.**
18-19yrs	**Mongoloid Men**	0.174	1	0.174	0.061	0.806
	Dravidian Men					
20-21yrs	**Mongoloid Men**	9.288	1	9.288	3.238	0.072
	Dravidian Men					
22- 23yrs	**Mongoloid Men**	40.230	1	40.230	14.024*	0.000
	Dravidian Men					
Mongoloid Men	**18-19yrs**	147.444	2	73.722	25.699*	0.000
	20-21yrs					
	22-23yrs					
Dravidian Men	**18-19yrs**	38.973	2	19.486	6.793*	0.001
	20-21yrs					
	22-23yrs					

From the above table, it is clearly shown that there is no significant difference between 18-19 years of Mongoloid and Dravidian men college students since the obtained F ratio of 0.061 is less than the table value of 3.86 at α = 0.05 for the df of 1 and 594. And also, there is no significant difference between 20-21 years of Mongoloid and Dravidian men college students since the obtained F ratio of 3.238 is less than the table value of 3.86 at α = 0.05 for the df of 1 and 594. Moreover, there is a significant difference in forearm circumference between 22-23 years of Mongoloid and Dravidian men college students since the obtained F ratio of 14.024 is greater than the table value of 3.86 at α = 0.05 for the df of 1 and 594.

Further, there is a significant difference in forearm circumference among age groups of Mongoloid men college students since the F ratio of 25.699 is greater than the table value of *3.02* at α = 0.05 for the df of 2 and 594. Also, there is a significant difference among age groups of Dravidian men college students since the F ratio 6.793 is greater than the table value *3.02* at α = 0.05 for the df of 2 and 594.

Table -10

Pairwise Comparisons (Post Hoc Test LSD) of Age on Forearm Circumference.

Source of variance	18-19yrs	20-21yrs	22-23yrs	M.D	95% C.I.
Age (both Race combined)	24.84	25.54		0.69*	0.66
	24.84		26.14	1.29*	
		25.54	26.14	0.61*	
Mongoloid Men	24.87	25.76		0.88*	0.92
	24.87		26.59	1.72*	
		25.76	26.59	0.84*	
Dravidian Men	24.82	25.33		0.51*	
	24.82		25.69	0.88*	
		25.33	25.69	0.37	

Table 10 shows that there is a significant difference in forearm circumference between 18-19 and 20-21 years, 18-19 and 22-23 years, and 20-21 and 22-23 years, respectively, as obtained value ($p < 0.05$). Further, there is a significant difference in forearm circumference between Mongoloid men college students of 18-19 and 20-21 years, 18-19 and 22-23 years, and 20-21 and 22-23 years, respectively, as obtained value ($p < 0.05$). Also, there is a significant difference in forearm circumference between 18-19 and 20-21; 18-19 and 22-23 years, but there is no significant difference between 20-21 and 22-23 years Dravidian college men students, respectively, as obtained value ($p < 0.05$).

Calf Circumference

Table -11

Descriptive Statistics on calf circumference between Mongoloid and Dravidian Men College Students with Respect to Age groups

Age group		Mongoloid	Dravidian	Total
18-19yrs	Mean	34.93	33.93	34.43
	S.D.	2.34	2.01	2.23
20-21yrs	Mean	35.74	34.33	35.04
	S.D.	2.35	2.57	2.56
22- 23yrs	Mean	36.87	35.26	36.06
	S.D.	2.93	2.89	3.02
Total	Mean	35.85	34.51	35.17
	S.D.	2.67	2.57	2.71

Table 11 reflects the descriptive values of mean and standard deviations of carl circumference on Mongoloid and Dravidian men college students of age groups 18-19 years, 20-21 years, and 22-23 years.

The statistical analysis between Mongoloid and Dravidian men college students in calf circumference is presented in Table 12.

Table -12

Summary of ANOVA (2X3) Factorial Design on Calf Circumference

Tests of between-subject effects					
Dependent Variable: calf circumference					
Source of variation	**Sum of square (ss)**	**df**	**MS**	**F**	**Sig.**
Factor A (Race)	270.145	1	270.145	41.983*	0.000
Factor B (Age)	274.382	2	137.191	21.321*	0.000
Interaction (Race x Age)	10.186	2	5.093	0.791	0.454
Error	3822.192	594	6.435		

** Significance at 0.05 level of confidence*

(Table values of 1 to 694 & 2 to 594 are 3.86 & 3.02 respectively)

It is clear from the above table that the calf circumference between Mongoloid and Dravidian college students from Manipur and Tamil Nadu reveals a significant difference irrespective of age, as the obtained F ratio of 41.983 is greater than the table value of 3.86 at $\alpha = 0.05$ for the df of 1 and 594. Further, there is a significant difference in calf circumference among age groups irrespective of race, as the obtained f ratio of 21.321 is greater than the table value of 3.02 for the df of 2 and 594. Moreover, there is no significant difference in calf circumference between the interaction of race and age, as the obtained f ratio of 0.791 is less than the required table value of 3.08 at $\alpha = 0.05$ for the df of 2 and 594. Since a significant difference is found among the age groups. So, a post hoc test is applied to age groups and presented in Table 13.

Table -13

Pairwise Comparisons (Post Hoc Test LSD) of Age (both Race combined) on Calf Circumference

18-19yrs	**20-21yrs**	**22-23yrs**	**M.D.**	**95% CI.**
34.58	35.23		605*	0.99
34.58		35.91	1.64*	
	35.23	35.91	1.03*	

Table 13 shows a significant difference in calf circumference between 18-19 and 2021 years, 20-21 and 22-23 years, and 18-19 and 22-23 years, respectively, as obtained value ($p < 0.05$).

Findings

The result of the present study on selected anthropometric variables of Mongoloid and Dravidian college students showed a significant difference. The result showed that there was a significant difference in body weight, standing height, forearm circumference, and calf circumference between Mongoloid and Dravidian college students, irrespective of age. Further, there was a significant difference in body weight, standing height, forearm circumference, and calf circumference between different age groups, irrespective of race. And there was an interaction between race and age in forearm circumference. Whereas there was no interaction between race and age in body weight, standing height, and calf circumference.

Conclusions

Mongoloid men college students are shorter in body height and lighter in body weight than Dravidian men college students, whereas Mongoloid men college students are bigger in forearm and calf than Dravidian men college students, irrespective of age. In age groups, 22-23-year-old men college students are heavier, taller, and bigger in the forearm and calf, followed by 20-21 and 18-19-year-old men college students. Moreover, there was an interaction between race and age in forearm circumference. In forearm circumference, there is no difference between 18-19yrs, 20-21yrs Mongoloid

and 18-19yrs, 20-21yrs Dravidian men college students, but a significant difference between 22-23yrs Mongoloid men college and 22-23yrs Dravidian men college students. Among Mongoloid men college students, 22-23 years have a bigger forearm, followed by 20-21 years and 18-19 years. Within Dravidian men college students, 20-21 years and 22-23 years have bigger forearms than 18-19 years, but there is no difference between 20-23 years and 22-23 years. The variation found to exist between the physical characteristics or anthropometry variation within Mongoloid and Dravidian men due to many factors such as heredity, geographical structure, and environment. The factors of nutrition, disease, socioeconomic status, urbanisation, physical activity, climate, and psychosocial deprivation all contribute to the growth of body dimensions (Wall, 1993). Despite genetic, non-genetic factors like social, nutritional, and environmental play a very important role in adult height (Nita Sharma Das N., 2023).

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