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Original Article

Anthropometric studies on students of the Nepal Medical College: Elbow breadth

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Abstract
Background: Body mass index is a valuable tool to assess the nutritional status of an individual. It can be used to identify subjects who are underweight and obese. The present study was conducted with a view to identify the prevalence of underweight and obesity among Nepalese medical students. The study also detects the body frame size of these medical students by elbow breadth measurements.
Aim of study: To measure Body mass index and body frame size based on elbow breadth measurements.
Materials and Methods: A total of 191 (males, 106) students participated in the study. The ratio of male to female was 1.24:1. The elbow breadth was measured by a vernier caliper (Tajima, Japan) to the nearest 0.1 mm. The body mass index (kg/m^2) (BMI) was calculated using the height and weight measurements taken previously[1]. Body frame size was obtained using a table [2] based on elbow width.
Data were analyzed using Microsoft excel for Windows 98.
Results: The study reveals that the prevalence of underweight and overweight in males of Nepal Medical college Vth batch were 30% and 1% and of IVth batch were 23.2% and 12.15% respectively. Of the females 38.6% and 2.2% of the IVth batch and 36.6% and 4.9% of the Vth batch were underweight and overweight respectively. The body frame size results indicted that 70% of the males and 61% of the females had small body frame. The study revealed a significant degree of under nutrition in male (26.4%) and female (20%) of Nepalese medical students.
Conclusion: The present study observed that majority of the medical students of the Nepal Medical College were of small body frame size.

Keywords: Anthropometry, Body frame size, Under nutrition, Nepal Medical College, and Medical Students

Body mass index is a valuable tool to assess the nutritional status of an individual. It can be conveniently used to identify those who are underweight and obese. In this paper the prevalence of underweight and obesity in a group of medical students is being reported. The present study also detects the body frame size of these medical students by elbow breadth measurements.

Materials and methods

This study is a continuation of the anthropometric study on Nepal Medical College students. The numbers of subjects and their mean values for age, height and weight have been reported earlier [1]. The elbow breadth was measured by a vernier caliper (Tajima, Japan) to the nearest 0.1 mm. The body mass index (kg/m^2)(BMI) was calculated using the height and weight measurements taken previously[1]. Body frame size was obtained using a table [2] based on elbow width.

Results

The age varied from 18-25 years with a mean ± SD of 20.90 ± 1.23 in males and in females with a mean ± SD of 20.52 ± 0.95. The BMI and elbow widths for the IVth and Vth batches are shown in Table-1. The combined BMI values of males varied from 15.24 to 30.07 and of females from 16.67 to 27.20 with a mean ± SD 21.69 ± 2.67 and 20.04 ± 2.06 respectively seen in Table 3. The BMI values and the elbow width according to the table are shown in Table 2.

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According to the BMI values the students were categorized as normal (20-24.9), undernourished (<20) and overweight (>25). In the IVth batch, 30% (15/50) of the males were undernourished with 1% (1/50) severely undernourished and 14% (7/50) were overweight. None of the males was obese. Of the Vth batch, 23.2% (13/56) of the males were undernourished and 8.9% (5/56) were overweight with 1.8% (1/56) obese (Table 4).

In the IVth batch 38.6% (17/44) of the females were undernourished and 2.2% (1/44) were overweight shown in Table 4. Similarly in the Vth batch 36.5% (15/41) were undernourished (mild) and 4.9% (2/41) were overweight. The combined BMI values indicated 26.4% (28/106) of the males and 37.6% (32/85) of females were undernourished and 12.3% (13/106) of males and 3.5% (3/85) of the females were overweight. The incidence of severe under nutrition was 0.94% (1/106) in males and a similar value was obtained for obesity. The result in general indicated a higher degree of under nutrition in both males (26.4%) and females (37.6%) in Nepalese Medical Students.

Table 1: Age and Anthropometric values for Male and Female Medical students

	MBBS IV Batch		*MBBS V Batch*	
	Males (N=50)	*Females (N=44)*	*Males (N=56)*	*Females (N=41)*
Age (Years)	*21.58 ± 1.03 (20-25)*	*21.02 ± 0.95 (19-24)*	*20.29 ± 1.08 (18-25)*	*20 ± .63 (19-21)*
Body Mass Index (kg/m^2)	*21.52 ± 2.70 (15.24–26.89)*	*20.77 ± 2.07 (16.61-25.96)*	*20.80± 2.65 (17.47– 0.02)*	*21.03± 2.07 (18.17– 27.20)*
Elbow Breadth (mm)	*63.68 ± 3.82 (53 – 72.9)*	*55.30 ± 3.16 (48 –63.6)*	*64.43± 3.05 (55.8 –71.5)*	*54.39 ± 2.67 (48.1 – 59.4)*

The inter-batch differences in mean values for Body Mass Index and Elbow Breadth of Males and Females are not significant

Table 2: Body Mass Index and Elbow breadth according to age and gender

	Age	N	BMI	Elbow width
IV-Batch Males	20	7	22.40 ± 2.92	60.28 ± 5.26
	21	17	21.32 ± 2.68	65.3 ± 3.65
	22	18	21.21 ± 2.75	63.79 ± 3.22
	23	7	22.01 ± 2.83	62.5 ± 2.85
	25	1	23.51	64.8
IV-Batch Females	19	1	19.73	51.0
	20	11	20.14 ± 2.20	56.12 ± 2.80
	21	22	20.72 ± 2.09	55.52 ± 3.13
	22	7	21.54 ± 2.03	54.21 ± 4.12
	23	2	22.36 ± 1.93	55.65 ± 0.77
	24	1	21.4	52.8
V-Batch Males	18	1	20.01	65.5
	19	8	21.24 ± 1.67	64.71 ± 2.05
	20	30	21.92 ± 3.08	64.68 ± 3.07
	21	11	21.61 ± 2.38	62.75 ± 3.37
	22	5	22.66 ± 2.78	64.60 ± 2.04
	25	1	22.05	71.1
V-Batch Females	19	8	19.74 ± 1.00	55.78 ± 2.09
	20	25	21.14 ± 1.88	53.82 ± 2.74
	21	8	21.98 ± 2.90	54.81 ± 2.67

The differences in the mean values between the age groups in a given batch and gender are not statistically significant

Table 3: Combined Anthropometric values for Male and Female Medical students

	Both Batches	
	Males (N=106)	Females (N=85)
Age (Years)	20.90 ± 1.23 (18-25)	20.52 ± 0.95 (19-24)
Body Mass Index (kg/m^2)	21.69 ± 2.67 (15.24 – 30.07)	20.04 ± 2.06 (16.67 – 27.20)
Elbow Breadth (mm)	64.08 ± 3.43 (53.00 – 72.9)	54.86 ± 2.95 (48.00 – 63.6)

Table 4: Body Mass Index of the medical students

	BMI (kg/m^2)	Batch IV		Batch V		Combined	
		Males	Females	Males	Females	Males	Females
Severe under weight	(< 15.9)	1	0	0	0	1	0
Moderate under weight	(16-7.9)	5	2	1	0	6	2
Mild under weight	(18-9.9)	9	15	12	15	21	30
Normal	(20-4.9)	28	26	37	24	65	50
Overweight	(25-9.9)	7	1	5	2	12	3
Obese	(>30)	0	0	1	0	1	0

Table 5: Body Frame size of the medical students

	Number of students					
	Batch IV		Batch V		Combined	
	Males	Females	Males	Females	Males	Females
Number	N=48	N=44	N=56	N=41	N=104	N=85
Small	36	24	37	28	73	52
Medium	12	20	19	13	31	33
Large	0	0	0	0	0	0

The combined and the individual body frame size of IVth and Vth batches based on elbow width are shown in Table 5. Seventy five percent (36/48) males of the IVth batch were of small body frame size and 25% (12/48) were of medium body frame size. Similarly in the Vth batch 66.07% (37/56) of the males had small frame and 34%(19/56) had medium size frame. In the IVth batch 54.54 % (24/44) of the females were of small frame size and 45.4% (20/44) were of medium frame. Similarly in the Vth batch 68.29% (28/41) females had small frame and 31.70% (13/41) had medium frame. Majority of the IVth batch of students were around 21 years and of the Vth batch around 20 years. The differences in the mean values for BMI and elbow width between the various age groups according to the genders of in a given batch were not significant.

Discussion

Based on BMI, a significant proportion of the medical students were observed to be underweight (males 26.4% and females 37.6%) and 12.26% of the males and 3.5% of the females to be overweight. The incidence of underweight in males compares well (23.6%) with that reported for the coloured population of the Cape Peninsula [3]. However, the prevalence recorded in our study was much lower compared to Bahraini native adults where the prevalence of overweight and obesity were 35.2% and 21.2 % for males and 31% and 48.7% female respectively [4].

None of the students had a large body frame. Majority of the males (70.2%) and females (61.2%) had small frames. Between the IVth and Vth batch of students it was observed that the % of males with small frame was significantly (Chi test p=0.000022) higher in the IVth batch (75%) than the Vth batch (66%). In the case of females the % with small frame was higher in the Vth batch (68.3) than the IVth batch (54.5) but this difference was not significant.

Conclusion

The present study observed that majority of the medical students of the Nepal Medical College were of small body frame size.

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