International Research Journal of Natural and Applied Sciences
ISSN: (2349-4077)
Impact Factor 7.032 Volume 10, Issue 06, June 2023
Website- www.aarf.asia, **Email** : editor@aarf.asia , editoraarf@gmail.com

Human Body Composition Values Measured Through Izana Measuring Tape Remain Close to Values Measured Through In Body 770, DXA and Clinical Methods

Khwaja Ahmad Shadab
Author Member, IRRO (Copyright Society for Literary Work)
418/1-C, ArunaAsaf Ali Marg, Qutab Institutional Area, New Delhi,Delhi 110067, India
shacomp@ymail.com

ABSTRACT
This paper includes the human body composition values measured through Izana Measuring Tape, the world's first tape measure or measuring tape thatquickly determines the human body composition even at tissue and molecular levels.Such measured values are compared with the values achieved through InBody 770, ACCUNIQ BC 380, DXA and clinical methods. It is found that the human body composition values measured through this invented non-electric tape remain close to the values achieved through InBody 770, ACCUNIQ BC 380, DXA and clinical methods.The present invention helps determine PBF, FFM, Total Body Water (TBW), Intracellular Water (ICW), Extracellular Water (ECW), Dry Lean Mass (DLM), Total Body Proteins (TBPro), Total Body Nitrogen (TBN), Minerals, Body Cell Mass (BCM), Bone Mass, Skeletal Muscle Mass (SMM), Appendicular Skeletal Muscle Mass (ASMM), Basal Metabolic Rate (BMR), BMI value, Waist Circumference to Body Height Ratio (WHtR), and Age Peak Height Velocity (in the growing children).
Key Words:*Measuring tape, measured values of human body composition*

INTRODUCTION
You might have used the simple measuring tapes in your daily life. These measure the height, length, distance, etc. But can these tapes quickly measure the values for human body composition at tissue and molecular levels? Can these depict your Total Body Water, Proteins, Minerals and SMM? To these questions, your answer will be 'No'.But the present invention 'Izana Measuring Tape' can accurately measure the values for such things. This invented tape functions as per the Body Shape Algorithm, which is developed by me on the basis of empirical relationship. The external and internal human body parts'imagesproved helpful.

Izana Measuring Tape**[1]**is composed of specific components. The developed empirical relationships help make the specific arrangements. The users need not wait for taking the result printouts. The users need not put in extra effort to collect the printed data for doing comparative study. This invented tape is very light in weight, non-clinical, non-invasive, non-electric, eco-friendly and easy to use. Even the early stage pregnant women, pacemaker holders, sick, obese or bedridden people can use this flexible measuring tape. This tape functions without the use of battery or any other power supply. The users get the accurate results instantly. Thistape is invented by me. For this work, the IPR process has been completed.

The following figure (Fig.1) shows the structure of Izana Measuring Tape:

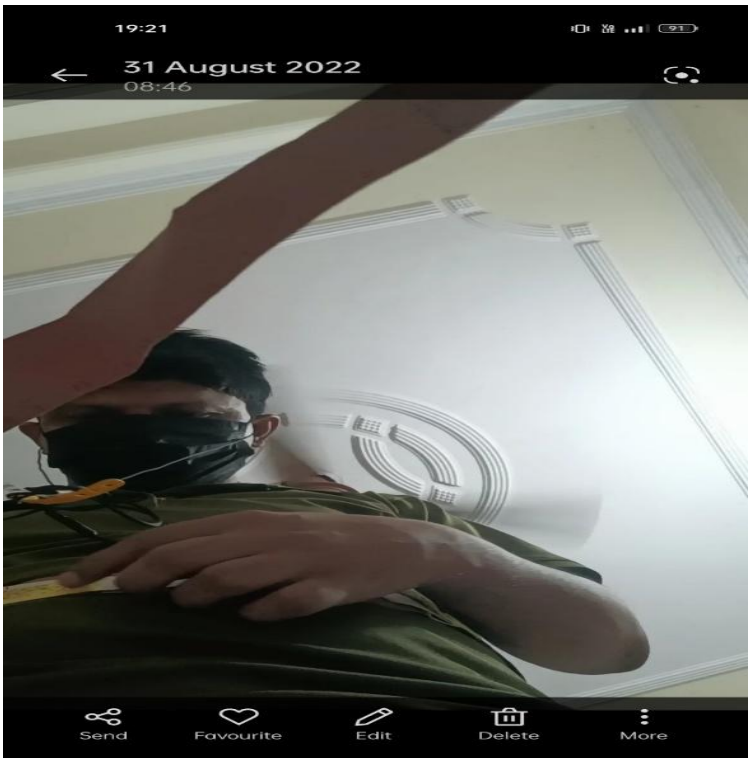


Fig. 1

Fig. 1(a)

The above picture (Fig.1(a) shows how a person can use non-electric flexible Izana Measuring Tape, easily.On the other hand, when we talk of BIA (Bioelectrical Impedance Analysis) machines or BIA scales,the process seems not so simple, as these BIA devices use the electrical method to measure body composition.All these BIA machines remain dependent on external power supply or batteries. The users have to take the result printouts and read the complex data for doing the comparative study. The well-equipped BIA machines are very costly**[2]**. In the case of pregnant women, pacemaker holders, sick, obese or bedridden people, these machines have limited applicability. The followingpicture (Fig.2) shows a powerful 8-electrode BIA machine (InBody 770). Here, you can find the price of this BIA device.

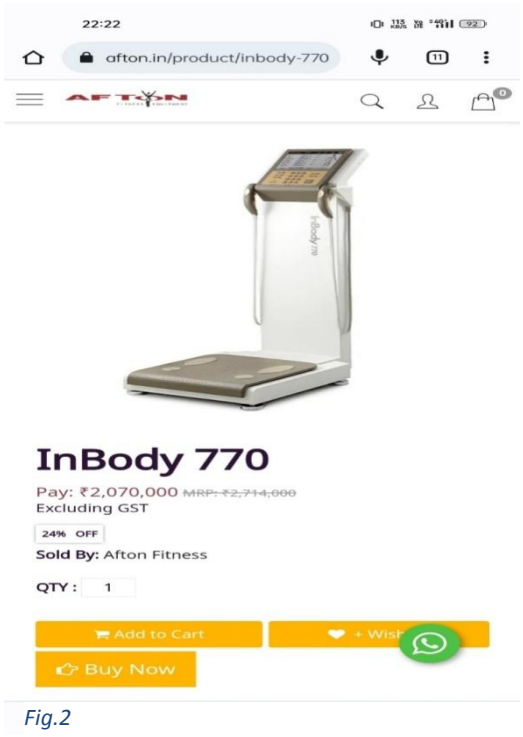


Fig.2

A) Why shouldyou use this Izana Measuring Tape

1.It helps you know whether you are Malnourished (Undernourished or Overnourished) or not; to what extent you are Malnourished.
2.It helps you know whether you are Overfat or not; to what extent you are Overfat.
3.It helps you know whether you have Healthy Water Balance in your body or not.
4.It shows your Metabolically Active Cell Mass (BCM).
5.It helps you know the amount of Skeletal Muscle which helps perform Body Movements.
6.This Flexible tape, very Light in weight, is Easy to Use. You can use and carry it Anywhere.
7.You don't need Battery, Electricity or any other Power Supply, to use it.
8.Youcan Instantly see your Results and Compare these at the same time with the Results of other people.
9.It helps you fight against Obesity.
10. It helps you achieve your goal to become Fit & Healthy.

B) What you find while you use this tape

1.It shows your Belly Fat.
2.It shows the comparative view of Body Fat.
3.It shows the amount of Water in your body.
4.It shows total amount of Protein in your body.
5.It shows the amount of Energy needed for your Life-sustaining Functions.
6.It shows your amount of Skeletal Muscle that helps you perform different Body Movements.

_ ,•

COMPARISON OF MEASURED VALUES

At first the body composition values of different groups of people are determined through Izana Measuring Tape. Their body height, body weight,age, gender, physical activities, body type, diet, and health conditions are recorded. The body composition values are recorded and tabulated. Then,more than hundred reputed journals are accessed to take help and analyze such results. In the journals, the body composition values were measured as per the subjects' physical status and features. InBody 770, DXA and other devices/methods were used to achieve the data.

After comparing the data of those people with the data of different subjects published in the journals, it is found that somespecific physical features have very important rolein the determination of body composition values. When such physical features remain same, the people and the subjects showalmost same body composition.

The body composition values of those people, whose specificfeaturesshowed similarity with the subjects'specific features, seemed remarkable.Soon, such body composition values (achieved through Izana Measuring Tape)are compared with the body composition values published in those reputed journals.InBody 770, DXA and other devices/methods were used to achieve thosebody composition values.

The values are presented through tables and charts. Such comparison is made to know how accurate Izana Measuring Tape is. In the case of a group of subjects, the average values are used as the data for a single subject.The physical status and features of subject helped determine Percentage Body Fat (PBF).

In this paper, it is not possible to include all the compared cases/subjects. So only some cases are being included. Along with each topic (TBW, DLM, TBN, SMM, ASMM, PV, etc.), the data source is being provided.

1) Total Body Water (TBW)

Look at Fig.3. Use the data**[3]** for verification. Compare it with Fig.3(a), Fig.3(b) and

TABLE 2. Physical characteristics of GHD adults and controls

Subject no.	GHD adults Age (yr)	Ht (cm)	Wt (kg)	BMI (kg/m²)	Body fat[b] (%)	Controls Age (yr)	Ht (cm)	Wt (kg)	BMI (kg/m²)	Body fat[b] (%)
Females										
1	30	157.5	65.1	26.2	41.9	30	170.1	69.2	23.9	33.6
2	45	173.1	90.1	30.1	42.6	43	172.0	96.1	32.5	37.3
3	44	170.9	61.2	21.0	38.0	46	170.6	60.5	20.8	24.3
4	56	167.3	63.5	22.7	36.2	55	170.4	68.9	23.7	31.9
5	53	164.1	72.3	26.8	38.2	67	162.1	61.3	23.3	35.8
Mean (SD)					39.4 (2.8)[a]					32.6 (5.1)[a]
Males										
6	28	174.5	61.0	20.0	30.4	32	178.3	66.0	20.8	12.7
7	46	179.2	77.1	24.0	29.4	44	185.0	72.9	21.3	25.5
8	54	166.9	61.4	22.0	27.3	55	171.1	62.4	21.3	22.1
9	63	176.4	71.5	23.0	22.9	67	179.3	80.1	24.9	12.0
10	58	178.4	79.5	25.0	26.4	60	182.6	77.3	23.2	24.0
Mean (SD)					27.3 (2.9)[a]					19.3 (6.4)[a]

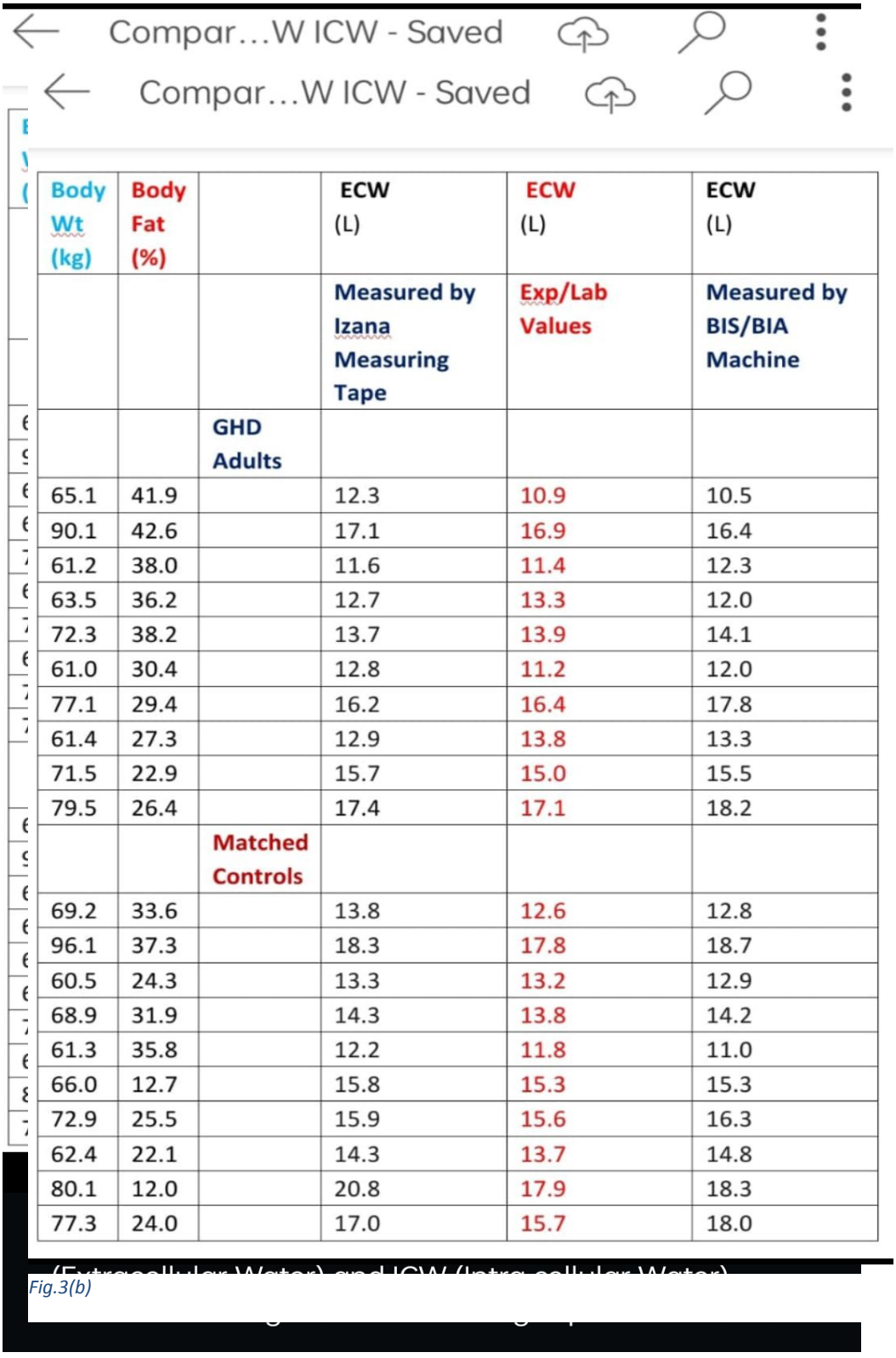
There were no significant differences in physical characteristics between the groups, with the exception of percent body fat.
[a] Statistically significant difference between GHD patients and controls ($P < 0.05$).

TABLE 3. TBW, ECW, ICW, and ECW/ICW of GHD adults and controls

Subject no.	By dilution: GHD adults TBW	ECW	ICW	ECW/ICW	By dilution: Matched controls TBW	ECW	ICW	ECW/ICW	By bioimpedance spectrometry: GHD adults TBW	ECW	ICW	ECW/ICW	By bioimpedance spectrometry: Matched controls TBW	ECW	ICW	ECW/ICW
Females																
1	27.2	10.9	16.3	0.67	33.0	12.6	20.4	0.62	24.9	10.5	14.4	0.73	32.0	12.8	19.2	0.67
2	37.3	16.9	20.4	0.83	43.4	17.8	25.6	0.70	34.5	16.4	18.09	0.91	44.4	18.7	25.7	0.73
3	27.3	11.4	15.9	0.71	33.0	13.2	19.8	0.66	28.2	12.3	15.9	0.77	30.2	12.9	17.4	0.74
4	29.2	13.3	15.9	0.83	33.8	13.8	20.0	0.69	25.3	12.0	13.3	0.90	31.9	14.2	17.7	0.81
5	32.2	13.9	18.3	0.75	28.3	11.8	16.5	0.71	32.9	14.1	18.8	0.75	26.6	11.0	15.7	0.70
Mean				0.76[a]				0.68[a]				0.81[a]				0.73[a]
SD				0.07				0.04				0.09				0.05
Males																
6	30.6	11.2	19.3	0.58	41.5	15.3	26.2	0.58	29.5	12.0	17.5	0.68	37.8	15.3	22.5	0.68
7	39.2	16.4	22.8	0.72	39.1	15.6	23.5	0.66	38.6	17.8	20.8	0.86	37.4	16.3	21.1	0.77
8	32.1	13.8	18.3	0.75	35.0	13.7	21.3	0.65	29.3	13.3	16.1	0.83	35.7	14.8	20.9	0.71
9	39.7	15.0	24.7	0.61	50.8	17.9	32.9	0.54	38.4	15.5	22.9	0.68	46.6	18.3	28.3	0.65
10	42.1	17.1	25.0	0.68	42.3	15.7	26.6	0.59	40.3	18.2	22.1	0.82	41.8	18.0	23.8	0.76
Mean				0.67[a]				0.61[a]				0.77[a]				0.17[a]
SD				0.07				0.05				0.09				0.05
Total mean (SD)				0.71[b]				0.64[b]				0.79[b]				0.72[b]
				0.08				0.06				0.08				0.05

Fig.3

Fig.3(c



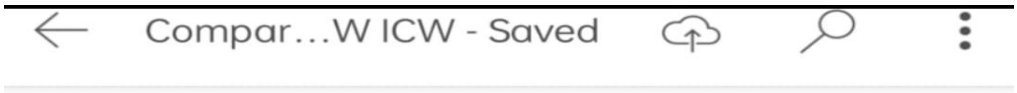
Body Wt (kg)	Body Fat (%)		ECW (L)	ECW (L)	ECW (L)
			Measured by Izana Measuring Tape	Exp/Lab Values	Measured by BIS/BIA Machine
		GHD Adults			
65.1	41.9		12.3	10.9	10.5
90.1	42.6		17.1	16.9	16.4
61.2	38.0		11.6	11.4	12.3
63.5	36.2		12.7	13.3	12.0
72.3	38.2		13.7	13.9	14.1
61.0	30.4		12.8	11.2	12.0
77.1	29.4		16.2	16.4	17.8
61.4	27.3		12.9	13.8	13.3
71.5	22.9		15.7	15.0	15.5
79.5	26.4		17.4	17.1	18.2
		Matched Controls			
69.2	33.6		13.8	12.6	12.8
96.1	37.3		18.3	17.8	18.7
60.5	24.3		13.3	13.2	12.9
68.9	31.9		14.3	13.8	14.2
61.3	35.8		12.2	11.8	11.0
66.0	12.7		15.8	15.3	15.3
72.9	25.5		15.9	15.6	16.3
62.4	22.1		14.3	13.7	14.8
80.1	12.0		20.8	17.9	18.3
77.3	24.0		17.0	15.7	18.0

Fig.3(b)

Fig.3(a)

2) Extracellular Water (ECW)

3) Intracellular Water (ICW)



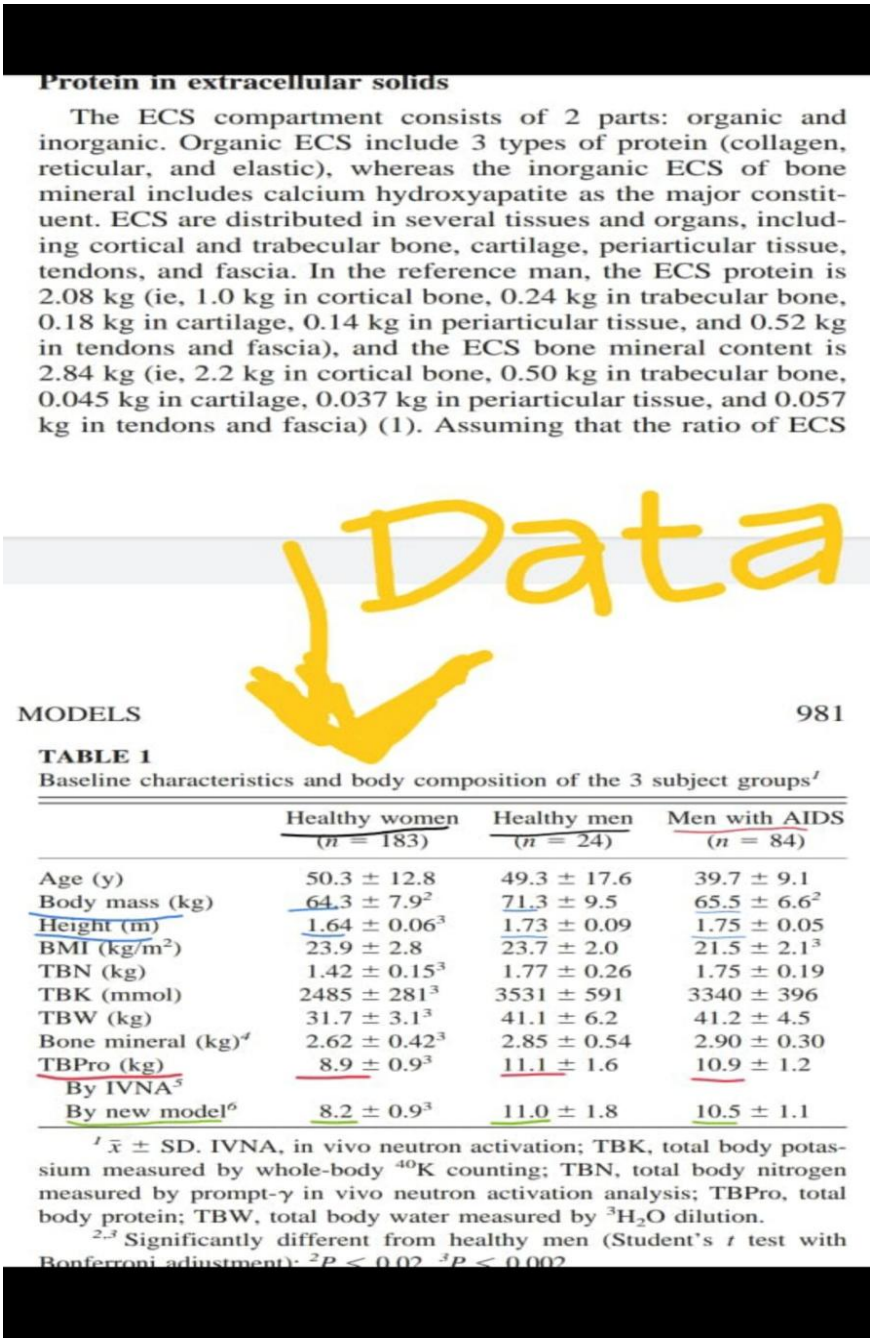
Body Wt (kg)	Body Fat (%)		ICW (L)	ICW (L)	ICW (L)
			Measured by Izana Measuring Tape	Exp/Lab Values	Measured by BIS/BIA Machine
		GHD Adults			
65.1	41.9		16.1	16.3	14.4
90.1	42.6		22.5	20.4	18.1
61.2	38.0		15.3	15.9	15.9
63.5	36.2		17.1	15.9	13.3
72.3	38.2		18.1	18.3	18.8
61.0	30.4		18.3	19.3	17.5
77.1	29.4		23.1	22.8	20.8
61.4	27.3		18.4	18.3	16.1
71.5	22.9		23.4	24.7	22.9
79.5	26.4		26.0	25.0	22.1
		Matched Controls			
69.2	33.6		19.1	20.4	19.2
96.1	37.3		24.0	25.6	25.7
60.5	24.3		20.0	19.8	17.4
68.9	31.9		20.4	20.0	17.7
61.3	35.8		16.4	16.5	15.7
66.0	12.7		25.1	26.2	22.5
72.9	25.5		23.7	23.5	21.1
62.4	22.1		22.2	21.3	20.9
80.1	12.0		32.0	32.9	28.3
77.3	24.0		25.5	26.6	23.8

Fig.3(c)

4) Total Body Proteins (TBPro)

Fig.4

Look at Fig.4(a). For verification, see the data**[4].** Compare it with Fig.4.



Protein in extracellular solids

The ECS compartment consists of 2 parts: organic and inorganic. Organic ECS include 3 types of protein (collagen, reticular, and elastic), whereas the inorganic ECS of bone mineral includes calcium hydroxyapatite as the major constituent. ECS are distributed in several tissues and organs, including cortical and trabecular bone, cartilage, periarticular tissue, tendons, and fascia. In the reference man, the ECS protein is 2.08 kg (ie, 1.0 kg in cortical bone, 0.24 kg in trabecular bone, 0.18 kg in cartilage, 0.14 kg in periarticular tissue, and 0.52 kg in tendons and fascia), and the ECS bone mineral content is 2.84 kg (ie, 2.2 kg in cortical bone, 0.50 kg in trabecular bone, 0.045 kg in cartilage, 0.037 kg in periarticular tissue, and 0.057 kg in tendons and fascia) (1). Assuming that the ratio of ECS

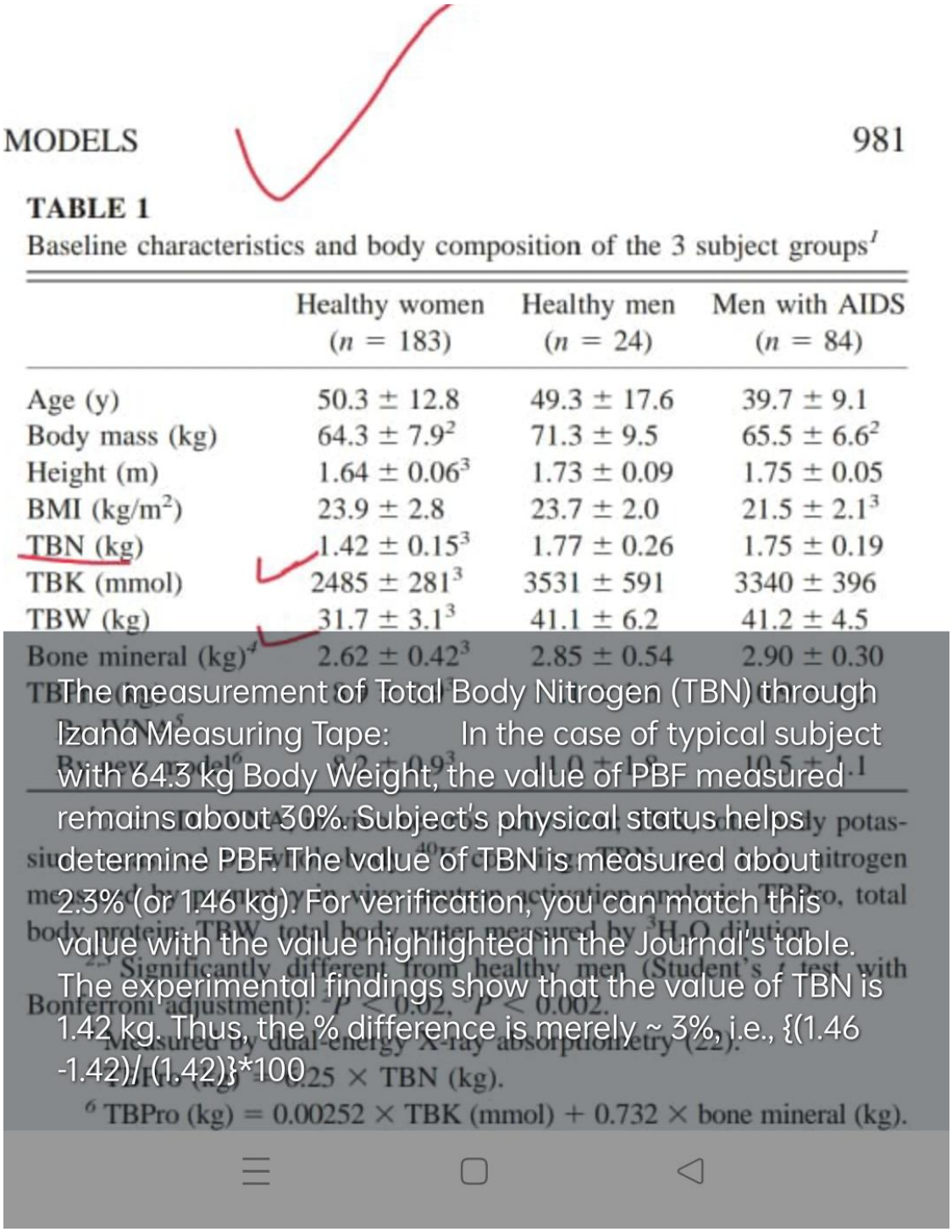
TABLE 1
Baseline characteristics and body composition of the 3 subject groups[1]

	Healthy women (n = 183)	Healthy men (n = 24)	Men with AIDS (n = 84)
Age (y)	50.3 ± 12.8	49.3 ± 17.6	39.7 ± 9.1
Body mass (kg)	64.3 ± 7.9[2]	71.3 ± 9.5	65.5 ± 6.6[2]
Height (m)	1.64 ± 0.06[3]	1.73 ± 0.09	1.75 ± 0.05
BMI (kg/m^2)	23.9 ± 2.8	23.7 ± 2.0	21.5 ± 2.1[3]
TBN (kg)	1.42 ± 0.15[3]	1.77 ± 0.26	1.75 ± 0.19
TBK (mmol)	2485 ± 281[3]	3531 ± 591	3340 ± 396
TBW (kg)	31.7 ± 3.1[3]	41.1 ± 6.2	41.2 ± 4.5
Bone mineral (kg)[4]	2.62 ± 0.42[3]	2.85 ± 0.54	2.90 ± 0.30
TBPro (kg)	8.9 ± 0.9[3]	11.1 ± 1.6	10.9 ± 1.2
By IVNA[5]			
By new model[6]	8.2 ± 0.9[3]	11.0 ± 1.8	10.5 ± 1.1

[1] $\bar{x}$ ± SD. IVNA, in vivo neutron activation; TBK, total body potassium measured by whole-body ^{40}K counting; TBN, total body nitrogen measured by prompt-γ in vivo neutron activation analysis; TBPro, total body protein; TBW, total body water measured by ^3H_2O dilution.
[2,3] Significantly different from healthy men (Student's t test with Bonferroni adjustment): [2] $P < 0.02$, [3] $P < 0.002$.

Fig.4(a)

5)Total Body Nitrogen (TBN)



MODELS 981

TABLE 1

Baseline characteristics and body composition of the 3 subject groups[1]

	Healthy women (n = 183)	Healthy men (n = 24)	Men with AIDS (n = 84)
Age (y)	50.3 ± 12.8	49.3 ± 17.6	39.7 ± 9.1
Body mass (kg)	64.3 ± 7.9[2]	71.3 ± 9.5	65.5 ± 6.6[2]
Height (m)	1.64 ± 0.06[3]	1.73 ± 0.09	1.75 ± 0.05
BMI (kg/m^2)	23.9 ± 2.8	23.7 ± 2.0	21.5 ± 2.1[3]
TBN (kg)	1.42 ± 0.15[3]	1.77 ± 0.26	1.75 ± 0.19
TBK (mmol)	2485 ± 281[3]	3531 ± 591	3340 ± 396
TBW (kg)	31.7 ± 3.1[3]	41.1 ± 6.2	41.2 ± 4.5
Bone mineral (kg)[4]	2.62 ± 0.42[3]	2.85 ± 0.54	2.90 ± 0.30

[6] TBPro (kg) = 0.00252 × TBK (mmol) + 0.732 × bone mineral (kg).

The measurement of Total Body Nitrogen (TBN) through Izana Measuring Tape: In the case of typical subject with 64.3 kg Body Weight, the value of PBF measured remains about 30%. Subject's physical status helps determine PBF. The value of TBN is measured about 2.3% (or 1.46 kg). For verification, you can match this value with the value highlighted in the Journal's table. The experimental findings show that the value of TBN is 1.42 kg. Thus, the % difference is merely ~ 3%, i.e., {(1.46 -1.42)/ (1.42)}*100

Fig.5

6)Dry Lean Mass (DLM)

Look at Fig.6(a). See the data**[2]** for verification.

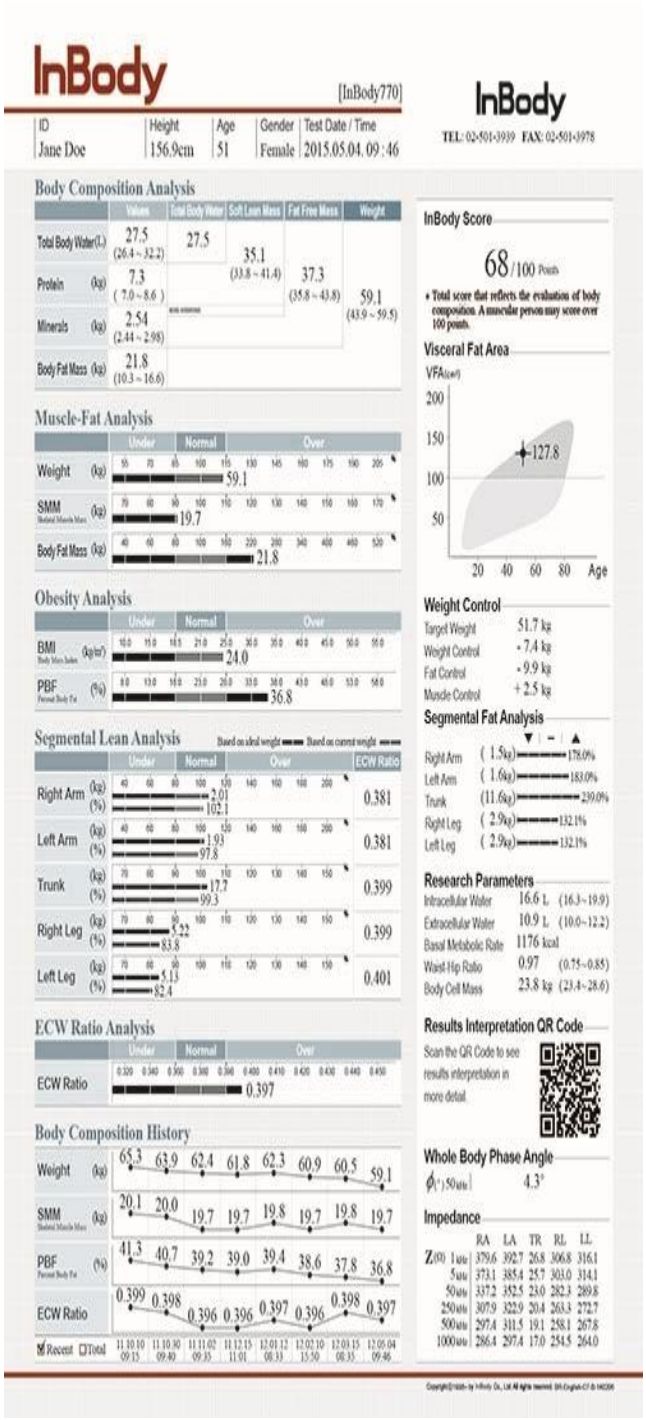
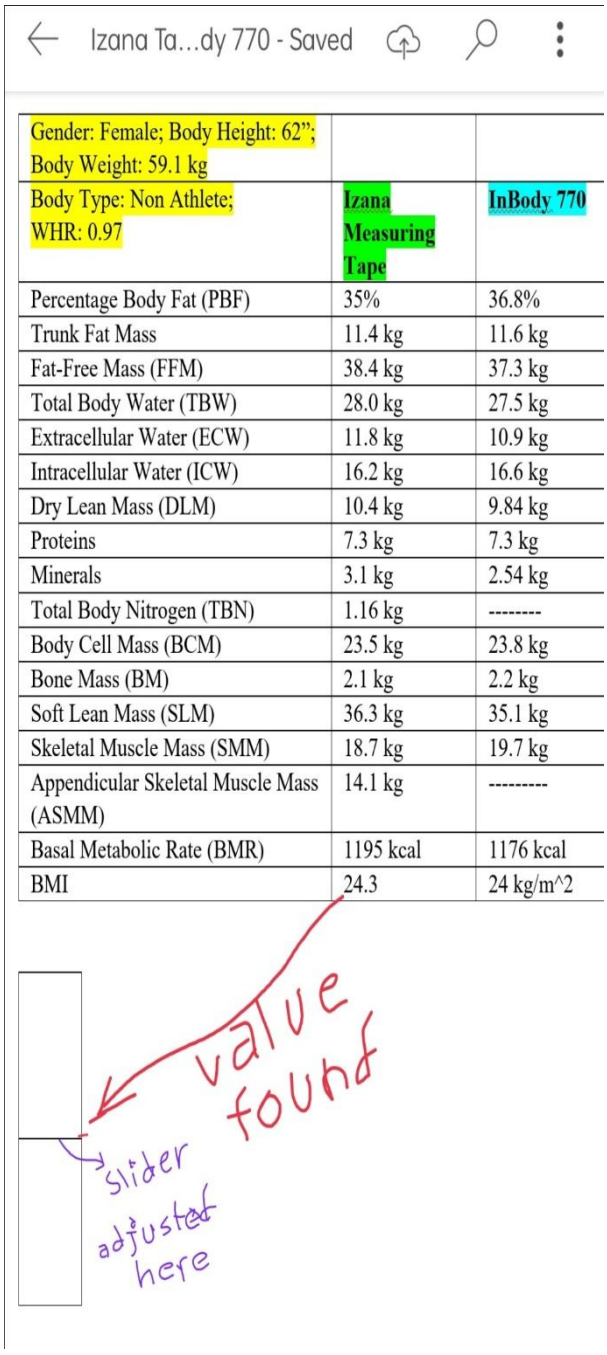


Fig.6(a)



Gender: Female; Body Height: 62"; Body Weight: 59.1 kg		
Body Type: Non Athlete; WHR: 0.97	**Izana Measuring Tape**	**InBody 770**
Percentage Body Fat (PBF)	35%	36.8%
Trunk Fat Mass	11.4 kg	11.6 kg
Fat-Free Mass (FFM)	38.4 kg	37.3 kg
Total Body Water (TBW)	28.0 kg	27.5 kg
Extracellular Water (ECW)	11.8 kg	10.9 kg
Intracellular Water (ICW)	16.2 kg	16.6 kg
Dry Lean Mass (DLM)	10.4 kg	9.84 kg
Proteins	7.3 kg	7.3 kg
Minerals	3.1 kg	2.54 kg
Total Body Nitrogen (TBN)	1.16 kg	--------
Body Cell Mass (BCM)	23.5 kg	23.8 kg
Bone Mass (BM)	2.1 kg	2.2 kg
Soft Lean Mass (SLM)	36.3 kg	35.1 kg
Skeletal Muscle Mass (SMM)	18.7 kg	19.7 kg
Appendicular Skeletal Muscle Mass (ASMM)	14.1 kg	---------
Basal Metabolic Rate (BMR)	1195 kcal	1176 kcal
BMI	24.3	24 kg/m^2

Fig.6

7) Body Cell Mass (BCM)

See Fig.6 and Fig.6(a), and compare the values.

8) Fat-Free Mass (FFM)

See this Fig.7. Look at a bar diagram. It remains divided into many parts through the different colours. If thered or pink part (shown as PBF) is excluded, then the remaining partsdepict the Fat-Free Mass (FFM).

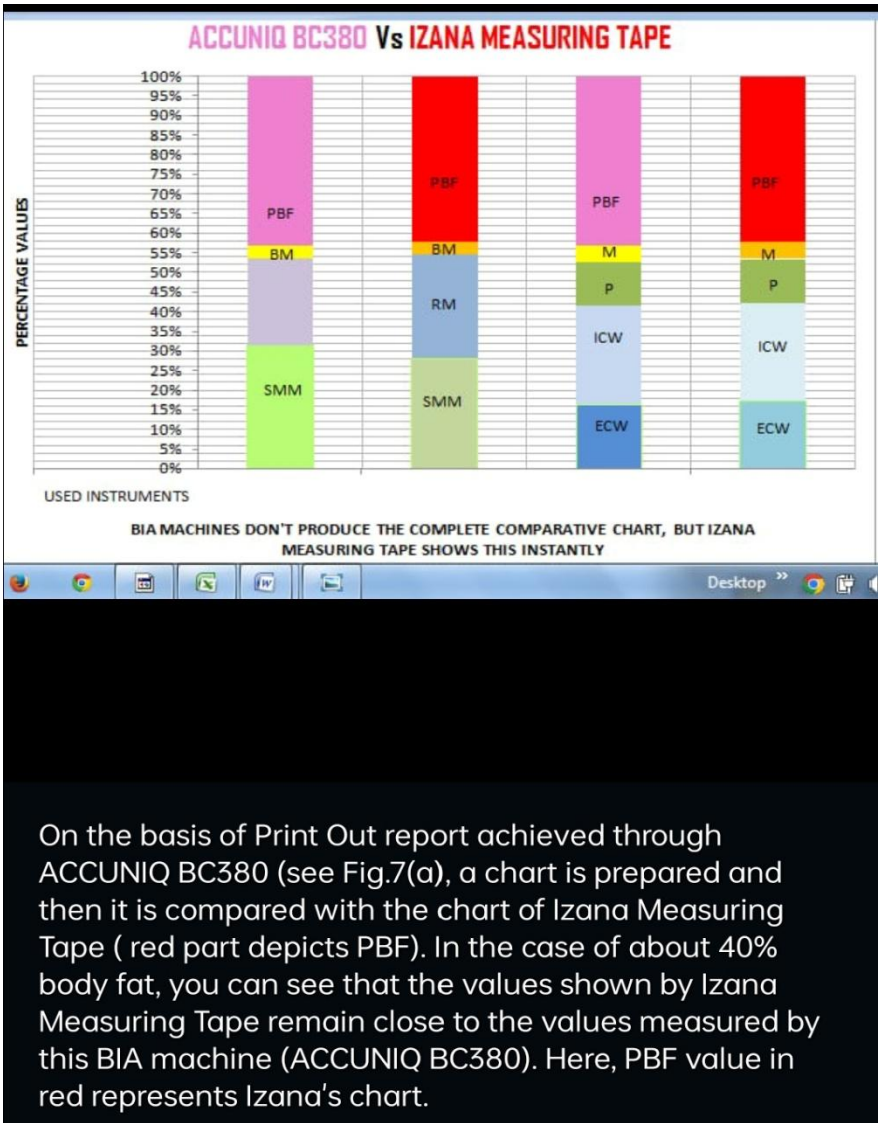


Fig.7

Look at Fig.7(a) for verification. Compare it with Fig.7.

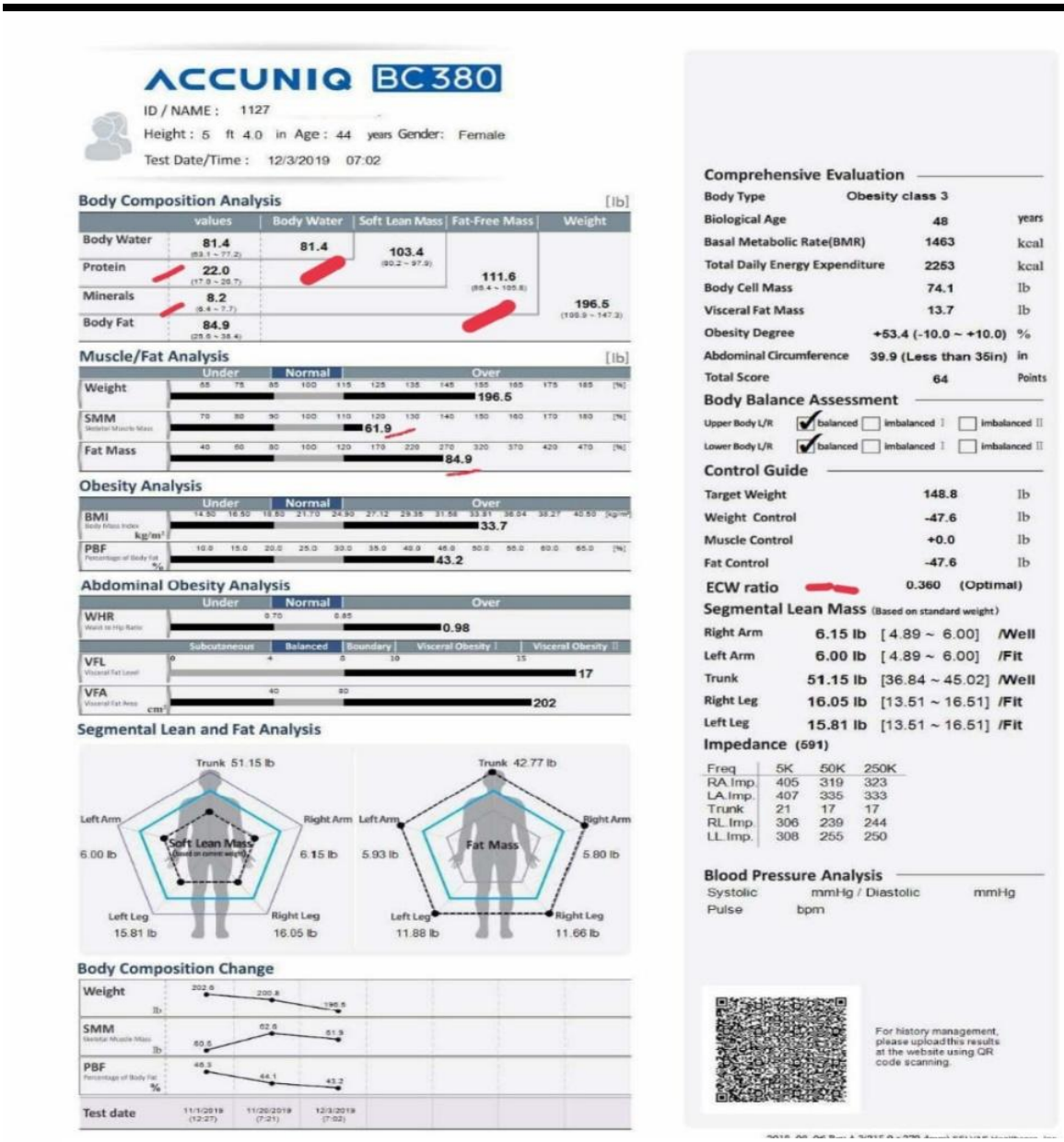


Fig.7(a)

9) Basal Metabolic Rate (BMR)
See Fig.6 and Fig.6(a), and compare the values.
10)BMI Equivalent Value

See Fig.6 and Fig.6(a), and compare the values.

11) Skeletal Muscle Mass (SMM)

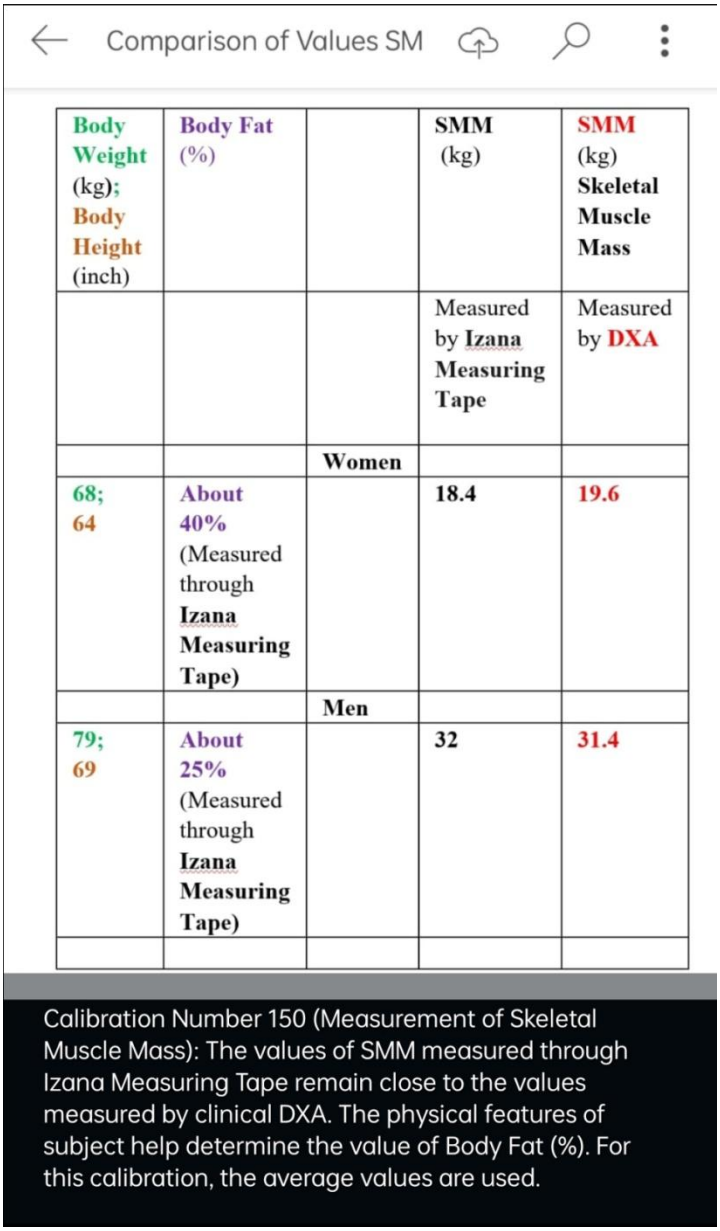


Fig.8

Look at Fig.8(a) and Fig.8(b). For verification, see the data**[5].** Compare these with Fig.8.

TABLE 2
SMM and FFM values by several methods[1]

	Women[2]	Men
	kg	
SMM_{KN}	19.9 ± 3.3	31.7 ± 4.0
SMM_{DXA}	19.6 ± 3.6	31.4 ± 4.4
FFM_{DXA}	37.4 ± 5.9	57.9 ± 6.7
FFM_{TBK}	41.1 ± 7.1[3]	58.8 ± 7.9
FFM_{SKF}	41.3 ± 5.1[3]	57.6 ± 6.4
FFM_{BIA}	41.6 ± 5.3[3]	57.3 ± 7.0
FFM_{4C}	42.6 ± 4.6[3]	59.4 ± 6.6[3]

[1] $\bar{x}$ ± SD. SMM, skeletal muscle mass; FFM, fat-free mass; KN, total body potassium and nitrogen; DXA, dual-energy X-ray absorptiometry; TBK, total body potassium; SKF, skinfold thicknesses; BIA, bioimpedance analysis; 4C, 4-compartment model.

[2] Significantly different from men, $P < 0.001$ (Student's t test for

Bone mineral

The minera
BMC as a per
was estimated
These measur
bution to inte
surement beca
to affect body
2-compartmer

Statistical ana

Correlation
Bland-Altman
of SMM estim
ods (TBK, SK

Fig.8(a)

TABLE 1
Subject characteristics[1]

	Women[2] (n = 50)	Men (n = 25)
Age (y)	63 ± 7 (54–84)	64 ± 7 (51–76)
Height (cm)	162 ± 6 (153–175)	174 ± 7 (160–187)
Weight (kg)	68 ± 12 (47–94)	79 ± 10 (49–95)
Percentage body fat (%)	38 ± 5 (28–48)	26 ± 4 (17–36)
Truncal fat:lean soft tissue[3]	0.9 ± 0.24 (0.33–1.5)	0.41 ± 0.13 (0.19–0.69)

[1] $\bar{x}$ ± SD; range in parentheses. Percentage body fat was determined from the sum of 4 skinfold thicknesses.

[2] All values, except for age, were significantly different from those in men, $P < 0.001$ (Student's t test for unpaired data).

[3] From dual-energy X-ray absorptiometry regional analysis.

spine and soft tis
combinations of
approach to DX
weighted linear fa
of the fat content

Truncal, abdor
the scan image by
Heymsfield et al
culated from the
and FFST. As an
fat to lean tissue
put by dividing t
sions of total BM
1.4%, 2%, and 2%

Fig.8(b)

12) Appendicular Skeletal Muscle Mass (ASMM)

Look at Fig.9(a).For verification, see the data**[6].**Compare it with Fig.9.

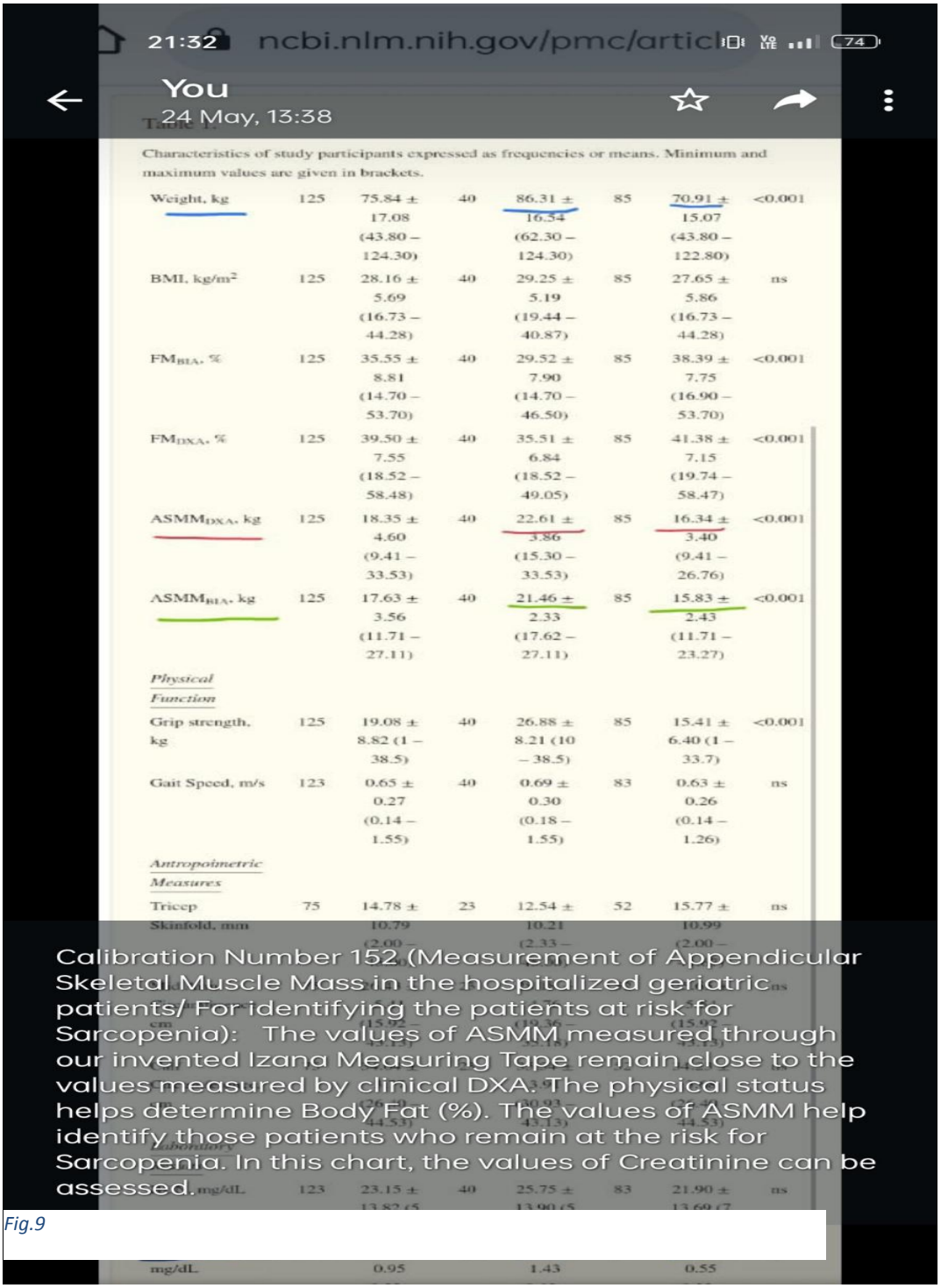

21:32
ncbi.nlm.nih.gov/pmc/artic
You
24 May, 13:38
Characteristics of study participants expressed as frequencies or means. Minimum and maximum values are given in brackets.
Weight, kg 125 75.84 ± 17.08 (43.80 – 124.30) 40 86.31 ± 16.54 (62.30 – 124.30) 85 70.91 ± 15.07 (43.80 – 122.80) <0.001
BMI, kg/m² 125 28.16 ± 5.69 (16.73 – 44.28) 40 29.25 ± 5.19 (19.44 – 40.87) 85 27.65 ± 5.86 (16.73 – 44.28) ns
FMBIA, % 125 35.55 ± 8.81 (14.70 – 53.70) 40 29.52 ± 7.90 (14.70 – 46.50) 85 38.39 ± 7.75 (16.90 – 53.70) <0.001
FMDXA, % 125 39.50 ± 7.55 (18.52 – 58.48) 40 35.51 ± 6.84 (18.52 – 49.05) 85 41.38 ± 7.15 (19.74 – 58.47) <0.001
ASMMDXA, kg 125 18.35 ± 4.60 (9.41 – 33.53) 40 22.61 ± 3.86 (15.30 – 33.53) 85 16.34 ± 3.40 (9.41 – 26.76) <0.001
ASMMBIA, kg 125 17.63 ± 3.56 (11.71 – 27.11) 40 21.46 ± 2.33 (17.62 – 27.11) 85 15.83 ± 2.43 (11.71 – 23.27) <0.001
Physical Function
Grip strength, kg 125 19.08 ± 8.82 (1 – 38.5) 40 26.88 ± 8.21 (10 – 38.5) 85 15.41 ± 6.40 (1 – 33.7) <0.001
Gait Speed, m/s 123 0.65 ± 0.27 (0.14 – 1.55) 40 0.69 ± 0.30 (0.18 – 1.55) 83 0.63 ± 0.26 (0.14 – 1.26) ns
Antropoimetric Measures
Tricep Skinfold, mm 75 14.78 ± 10.79 (2.00 – 23 12.54 ± 10.21 (2.33 – 52 15.77 ± 10.99 (2.00 – ns
mg/dL 123 23.15 ± 40 25.75 ± 83 21.90 ± ns
mg/dL 0.95 1.43 0.55
Calibration Number 152 (Measurement of Appendicular Skeletal Muscle Mass in the hospitalized geriatric patients/ For identifying the patients at risk for Sarcopenia): The values of ASMM measured through our invented Izana Measuring Tape remain close to the values measured by clinical DXA. The physical status helps determine Body Fat (%). The values of ASMM help identify those patients who remain at the risk for Sarcopenia. In this chart, the values of Creatinine can be assessed.

Fig.9

Fig.9(a)

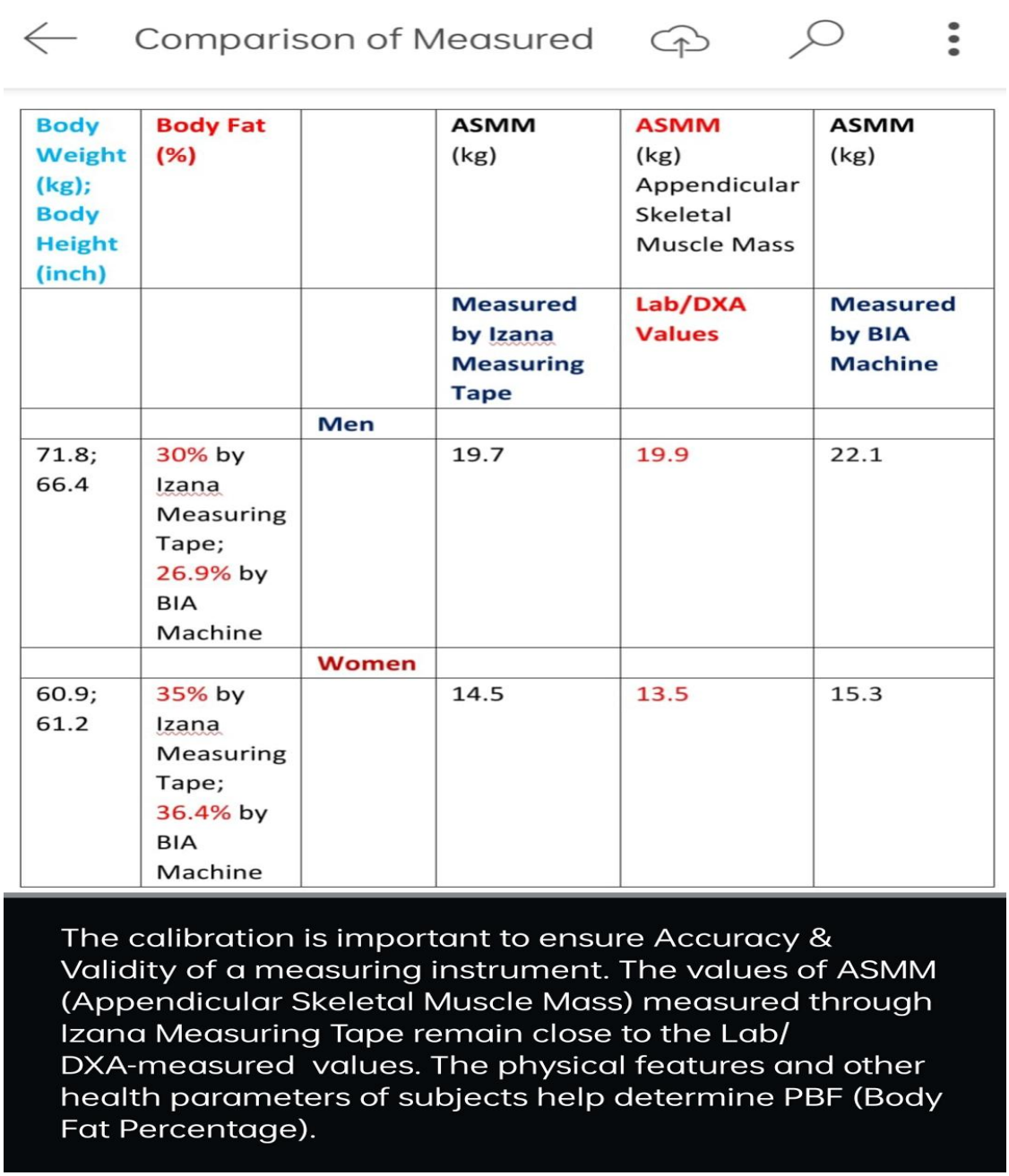


Fig.10

Now look at Fig.10(a). For verification, see the data**[7].**Compare it with Fig.10.

percentage assessed by BIA was greater in women than in men.

Table 1. Anthropometric and biochemical characteristics and comorbidity of the study p
(n = 507).

	Men (n = 213)	Women (n = 294)
Age (years)	64.1 ± 1.3	63.4 ± 10.3
Height (cm)	168.6 ± 5.8	155.4 ± 5.6
Weight (kg)	71.8 ± 11.0	60.9 ± 10.2
BMI (kg/m^2)	25.2 ± 3.1	25.2 ± 3.8
Waist circumference (cm)	88.9 ± 6.3	84.9 ± 8.9
SBP (mmHg)	128.4 ± 13.7	127.2 ± 13.9
DBP (mmHg)	74.7 ± 10.1	75.2 ± 9.1
Laboratory findings		
FPG (70–110 mg/dL)	135.0 ± 41.5	117.6 ± 33.9
HbA1c (4.0–6.4%)	7.1 ± 1.4	6.6 ± 1.2
WBC (4–10 × 10^3/μL)	6.4 ± 1.7	5.6 ± 1.6
Hemoglobin (13–17 g/dL)	14.6 ± 1.5	13.2 ± 1.0
Hematocrit (39–52%)	43.1 ± 4.1	39.7 ± 3.0
Platelet (130–400 × 10^3/μL)	211.5 ± 52.9	243.4 ± 53.9
Total cholesterol (0–240 mg/dL)	161.1 ± 36.1	180.8 ± 40.2
Triglycerides (0–200 mg/dL)	139.2 ± 90.5	132.4 ± 65.6
HDL-cholesterol (35–55 mg/dL)	47.5 ± 10.5	54.9 ± 11.9
LDL-cholesterol (0–130 mg/dL)	91.6 ± 27.3	102.1 ± 29.9

Nutrients **2018**, *10*, 738

Table 1. *Cont.*

	Men (n = 213)	Women (n = 294)
BUN (10–26 mg/dL)	17.4 ± 11.4	15.0 ± 4.3
Creatinine (0.70–1.40 mg/dL)	0.9 ± 0.2	0.7 ± 0.1
eGFR (mL/min/1.73 m^2)	85.3 ± 18.8	90.5 ± 19.3
Total protein (6.0–8.0 g/dL)	7.2 ± 0.4	7.3 ± 0.4
Albumin (3.3–5.2 g/dL)	4.4 ± 0.3	4.4 ± 0.2
AST (1–40 IU/L)	25.7 ± 8.3	27.2 ± 15.0
ALT (1–40 IU/L)	27.1 ± 13.8	26.1 ± 20.1
Muscle mass by DXA		
Whole body lean mass (kg)	46.8 ± 6.5	34.0 ± 4.8
Appendicular skeletal muscle mass (kg)	19.9 ± 3.2	13.5 ± 2.2
Muscle mass by BIA		
Whole body muscle mass (kg)	49.3 ± 6.6	36.1 ± 4.7
Appendicular skeletal muscle mass (kg)	22.1 ± 3.3	15.3 ± 2.5
Fat mass by BIA		
Fat mass (kg)	19.6 ± 5.7	22.5 ± 6.8
Fat percent (%)	26.9 ± 5.7	36.4 ± 6.3

Data are expressed as the mean ± SD. BMI, body mass index; WC, waist circumference; SBP, systolic bl
DBP, diastolic blood pressure; WBC, white blood cell; FPG, fasting plasma glucose; LDL, low-densit
HDL, high-density lipoprotein; BUN, blood urea nitrogen; eGFR, estimated glomerular filtration rate; A
transaminase; ALT, alanine transaminase; DXA, dual-energy x-ray absorptiometry; BIA, bioelectric
analysis. * p values by Student's t-test between men and women.

3.2. *Comparison of Muscle Mass Estimated by BIA with That Measured by DXA (Table 2)*

The WBMM and ASMM values estimated by BIA were highly correlated with t
by DXA in the entire study group (both $r > 0.97$, $p < 0.01$). We then investigated whe
between muscle masses measured by DXA and BIA were associated with anthr
biochemical parameters. Using ANOVA, the differences in WBMM between the two

Fig.10(a)

13) ASMI

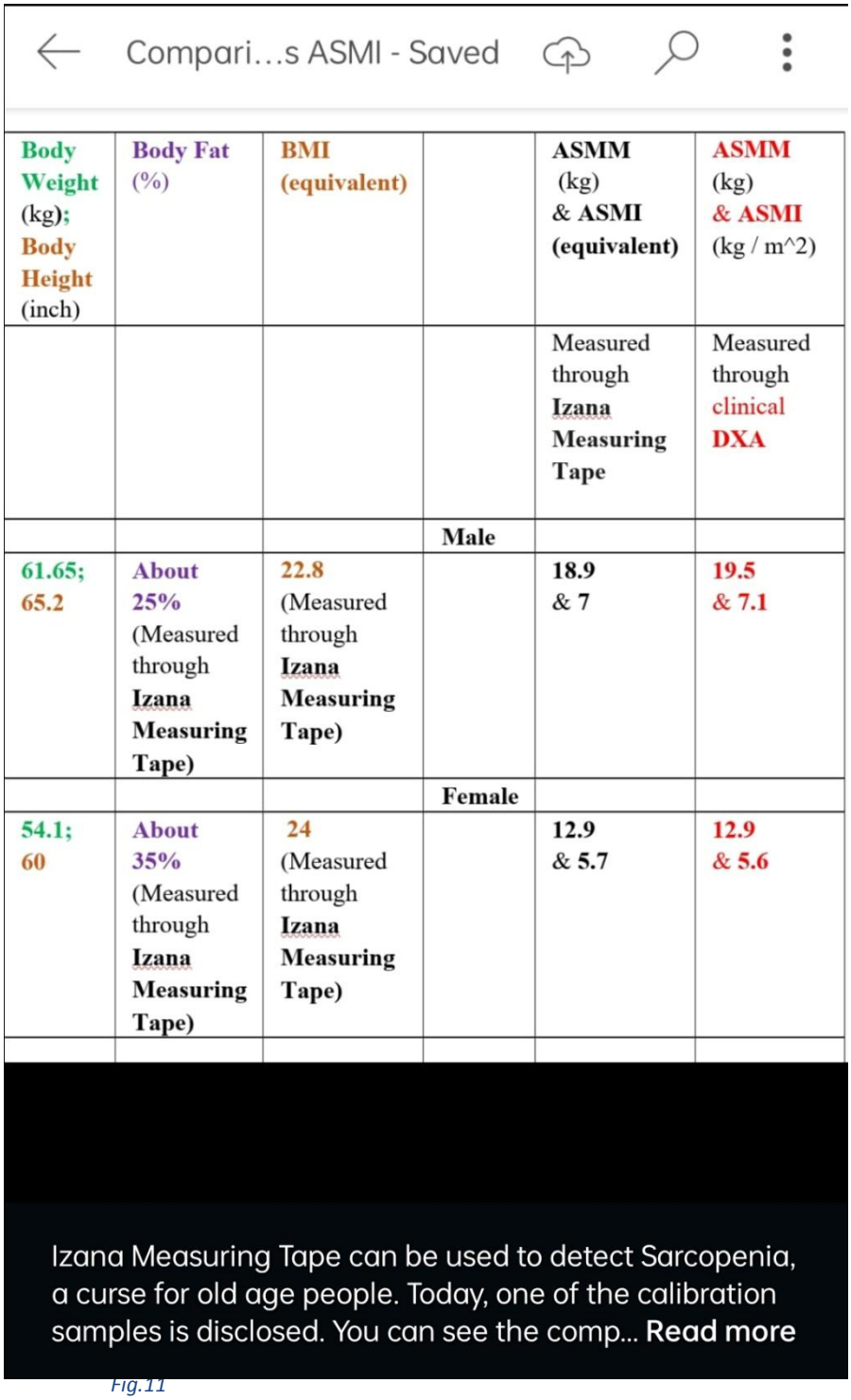
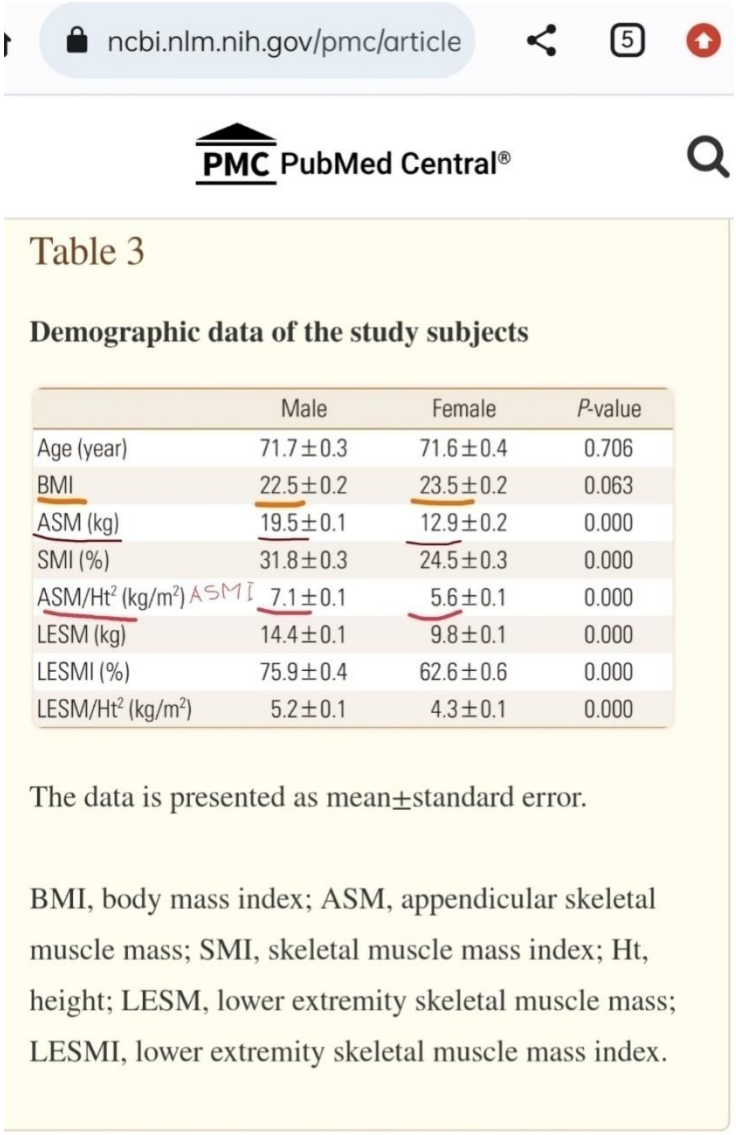


Fig.11

Look at Fig.11(a). For verification, see the following data**[8].**Compare it with Fig.11.



ncbi.nlm.nih.gov/pmc/article

PMC PubMed Central®

Table 3

Demographic data of the study subjects

	Male	Female	*P*-value
Age (year)	71.7±0.3	71.6±0.4	0.706
BMI	22.5±0.2	23.5±0.2	0.063
ASM (kg)	19.5±0.1	12.9±0.2	0.000
SMI (%)	31.8±0.3	24.5±0.3	0.000
ASM/Ht^2 (kg/m^2) ASMI	7.1±0.1	5.6±0.1	0.000
LESM (kg)	14.4±0.1	9.8±0.1	0.000
LESMI (%)	75.9±0.4	62.6±0.6	0.000
LESM/Ht^2 (kg/m^2)	5.2±0.1	4.3±0.1	0.000

The data is presented as mean±standard error.

BMI, body mass index; ASM, appendicular skeletal muscle mass; SMI, skeletal muscle mass index; Ht, height; LESM, lower extremity skeletal muscle mass; LESMI, lower extremity skeletal muscle mass index.

Prevalence of sarcopenia

ased on the cut-off value set by the reference

Fig.11(a)

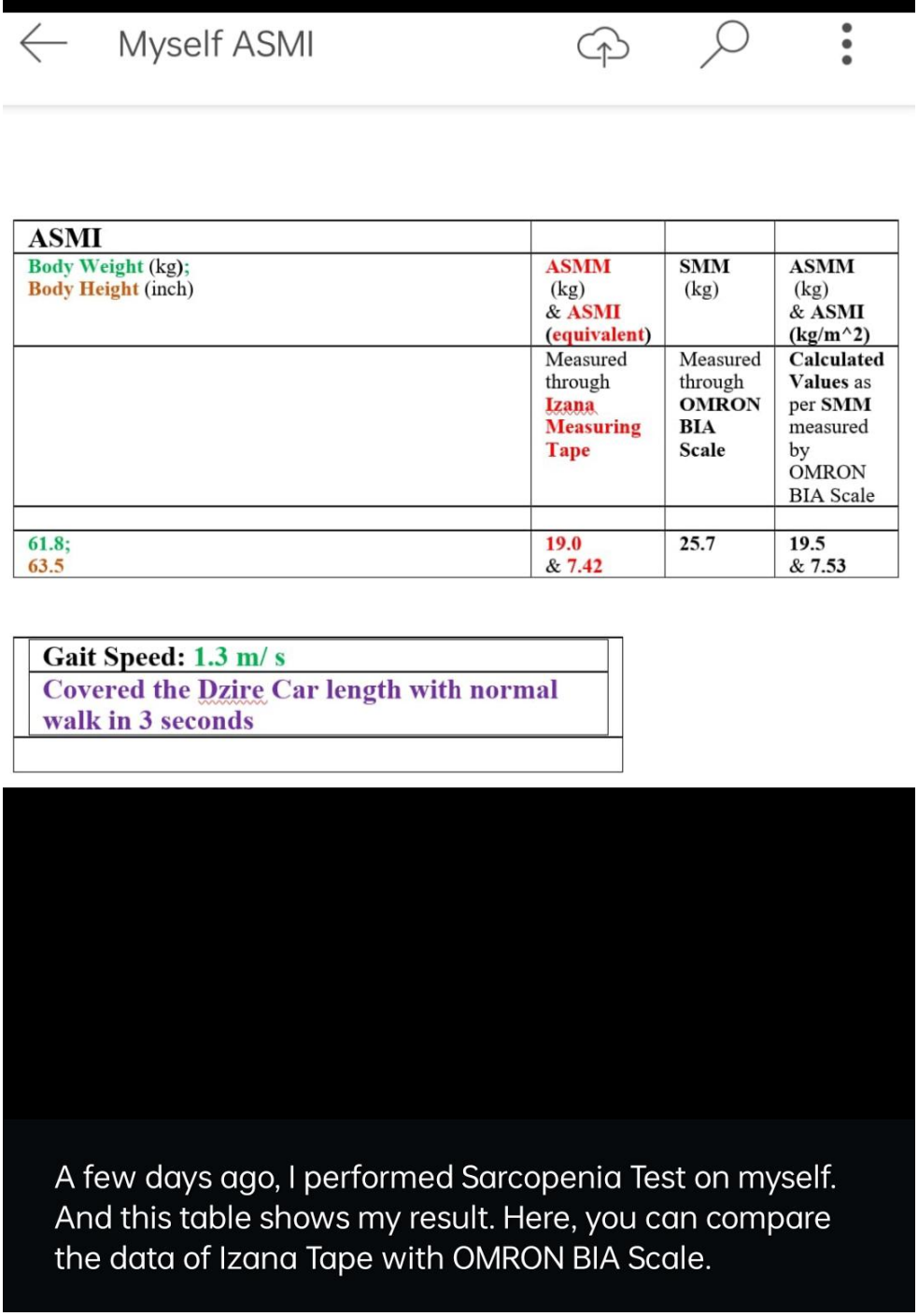
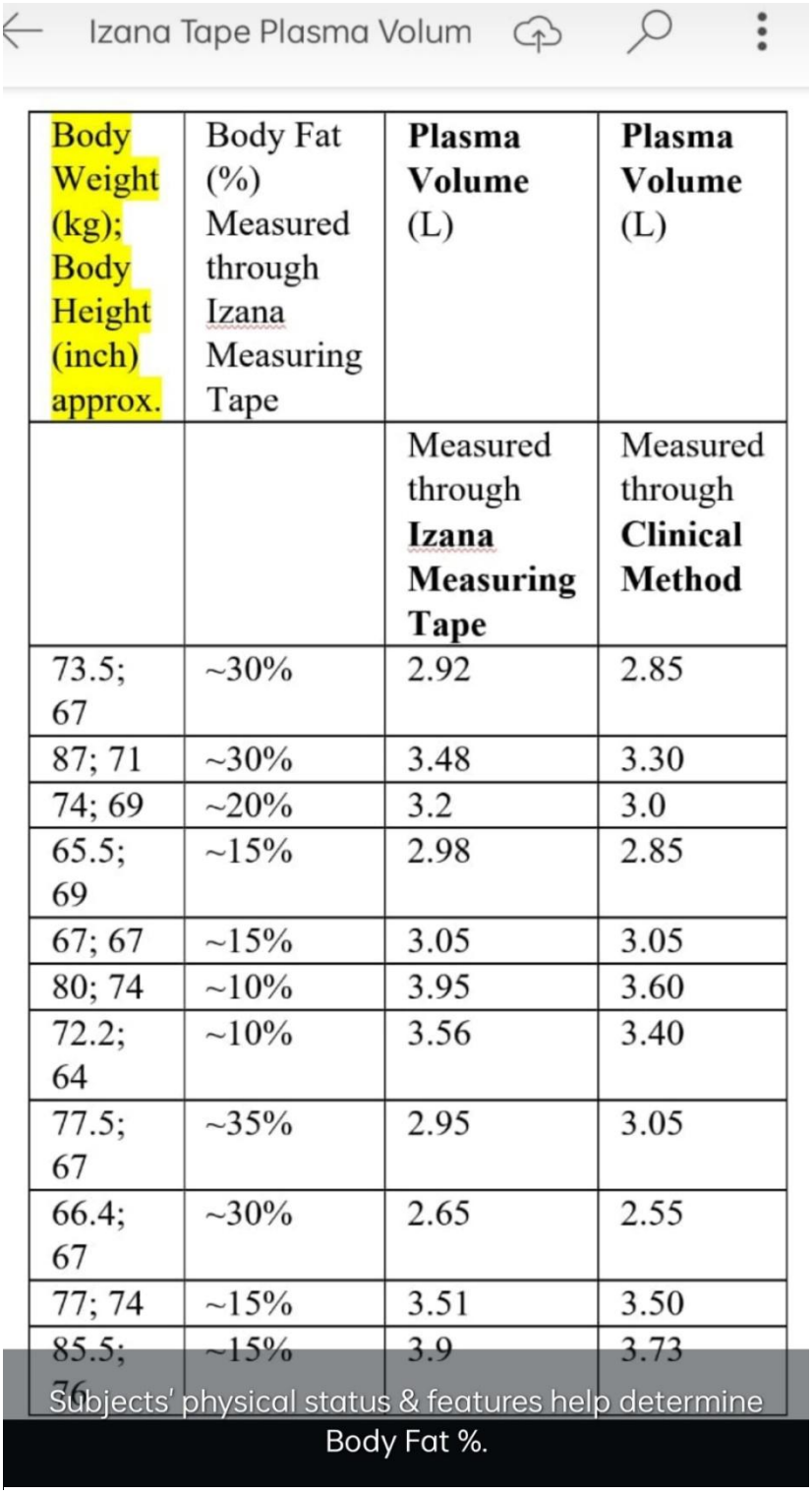


Fig.12

14) Blood Plasma

Now look at Fig.13(a). For verification, see the data**[9].** Compare it with Fig.13.



Body Weight (kg); Body Height (inch) approx.	Body Fat (%) Measured through Izana Measuring Tape	**Plasma Volume** (L)	**Plasma Volume** (L)
		Measured through **Izana Measuring Tape**	Measured through **Clinical Method**
73.5; 67	~30%	2.92	2.85
87; 71	~30%	3.48	3.30
74; 69	~20%	3.2	3.0
65.5; 69	~15%	2.98	2.85
67; 67	~15%	3.05	3.05
80; 74	~10%	3.95	3.60
72.2; 64	~10%	3.56	3.40
77.5; 67	~35%	2.95	3.05
66.4; 67	~30%	2.65	2.55
77; 74	~15%	3.51	3.50
85.5; 76	~15%	3.9	3.73

Fig.13

Table 2

Plasma Volume, Extracellular Water, and Peripheral Plasma Renin Activity in Normal and Essential Hypertensive Subjects

No.	Weight (kg)	Height (cm)	PV (L)	ECW (L)	PV/IF	Renin (ng/ml/4 hr)
			Normotensive Patients			
1.	73.5	171	2.85	15.2	0.231	0.44
2.	87	180	3.30	18.1	0.223	2.0
3.	74	175	3.00	16.5	0.223	1.5
4.	65.5	176.5	2.85	16.1	0.216	1.8
5.	67	171	3.05	16.7	0.223	1.0
6.	80	188	3.60	21.1	0.206	0.54
7.	72.2	163.7	3.40	18.8	0.221	—
8.	77.5	169.4	3.05	15.8	0.239	1.2
9.	66.4	170	2.55	13.9	0.224	2.5
10.	77	186.7	3.50	18.7	0.230	0.4
11.	85.5	193	3.73	21.4	0.211	—
			Patients with Essential Hypertension			

Fig.13(a)

15) APHV

	BOYS	
Age Group (**Years**)	**APHV** Value Measured through **Izana Measuring Tape**	**Experimental**/ Measured Value of **APHV** (Average value for 1864 boys)
6 – 6.9	11.9	11.9
7 – 7.9	12.5	12.4
8 – 8.9	12.8	12.8
9 – 9.9	13.2	13.2
10 - 10.9	13.5	13.5
11 –11.9	13.8	14
12 –12.9	14.2	14.3
13 – 13.9	14.4	14.5
14 – 14.9	14.6	14.6
15 – 15.9	15	14.9
16 – 16.9	15.5	15.4
17 – 17.9	16.1	15.8
	GIRLS	(Average value for 734 girls)
8 – 8.9	11.1	11.5
9 – 9.9	11.4	11.5
10 – 10.9	11.7	11.5
11 – 11.9	11.9	11.4

Fig.14

Table 1. Variables representing the sample studied.

Ages (years)	N	Weight (kg)		Standing Height (cm)		Sitting Height (cm)		BMI		APHV		MEF (L/min)	
		X	SD	X	SD	X	SD	X	SD	X	DE	X	SD
						Males							
6.0–6.9	59	26.7	5.5	121.4	5.3	64.8	4.0	18.1	3.2	−5.9	0.3	159.8	38.1
7.0–7.9	85	25.9	5.7	125.3	5.7	66.1	3.5	16.4	3.1	−5.4	0.3	171.7	45.4
8.0–8.9	136	30.4	7.3	129.3	5.5	69.0	3.4	18.1	3.8	−4.8	0.3	206.2	35.9
9.0–9.9	166	34.5	9.0	133.6	6.3	71.2	4.1	19.1	3.7	−4.2 *	0.4	214.1	48.2
10.0–10.9	194	39.5	9.6	139.7	6.9	74.1	4.4	20.1	4.0	−3.5 *	0.4	235.0	45.8
11.0–11.9	176	44.2	10.2	144.3	6.8	75.3	3.6	21.1	4.2	−3.0 *	0.4	263.0	50.0
12.0–12.9	166	44.0	10.1	148.2	8.0	77.1	4.3	19.9	3.6	−2.3 *	0.5	286.8 *	61.1
13.0–13.9	199	49.0	10.7	154.5	8.4	80.4	4.3	20.5	3.8	−1.5 *	0.5	305.5 *	69.8
14.0–14.9	209	55.8 *	12.7	161.3 *	7.7	83.9	4.9	21.4	4.1	−0.6 *	0.7	329.4 *	84.8
15.0–15.9	211	60.5 *	12.8	165.6 *	6.7	85.5 *	4.6	22.0	4.1	0.1 *	0.6	344.2 *	102.3
16.0–16.9	192	59.9 *	11.5	166.9 *	6.1	86.3 *	3.9	21.5	3.7	0.6 *	0.6	354.3 *	94.0
17.0–17.9	71	59.9 *	9.5	168.6 *	5.6	87.0 *	4.9	21.1 *	3.2	1.2 *	0.8	351.5 *	110.5
Total	1864	46.5	15.4	149.4	16.1	78.1	8.0	20.3	4.1	−2.1	2.1	284.3	94.2
						Females							
6.0–6.9	60	24.4	4.6	118.7	5.0	62.9	2.9	17.4	3.6	−5.3	0.3	133.2	45.6
7.0–7.9	76	25.7	5.3	124.2	7.0	65.4	4.0	16.7	3.4	−4.5	0.4	158.2	36.1
8.0–8.9	148	30.8	8.0	129.4	7.1	68.8	3.8	18.2	4.0	−3.5	0.5	191.2	43.3
9.0–9.9	179	33.5	9.0	134.5	7.6	71.2	4.3	18.4	3.8	−2.5	0.6	209.0	48.3
10.0–10.9	199	36.6	11.2	139.2	7.2	73.2	4.2	18.7	5.1	−1.5	0.7	226.7	50.7
11.0–11.9	208	44.3	9.8	145.1	6.4	75.5	4.7	21.0	4.3	−0.4	0.7	244.9	58.5
12.0–12.9	189	45.5	10.0	148.3	6.3	78.0	3.4	20.5	3.6	0.8	0.7	260.0	54.3
13.0–13.9	219	49.5	11.0	151.7	6.0	80.6	3.3	21.4	4.0	1.8	0.8	259.1	62.1
14.0–14.9	245	52.5	8.6	154.3	6.0	82.0	3.0	22.1	3.3	3.0	0.7	269.4	52.6
15.0–15.9	235	53.8	9.3	156.6	6.2	83.1	3.5	21.9	3.7	3.9	0.7	275.9	74.4
16.0–16.9	218	53.1	7.8	157.1	5.9	82.9	3.2	21.5	2.9	4.7	0.7	269.4	70.1
17.0–17.9	69	57.1	9.7	157.6	7.1	83.1	5.4	23.0	3.3	5.7	1.0	276.0	77.3
Total	2045	44.6	13.3	146.2	12.6	77.2	7.0	20.5	4.2	0.8	3.1	244.3	68.4

Legend: H: Height; X: Average; SD: Standard deviation; APHV: Age of Peak Velocity Growth; MEF: Maximum Expiratory Flow, (* = 0.005).

The comparisons between the curves of international studies are displayed in Figure 1. At all age ranges, the values of the curves (p50) for Spain and Italy are higher than those reported in Arequipa (Peru). For females, the values for Spain and Italy were higher

Fig.14(a)

CONCLUSION

After making a comparison, it is found that the present invention 'Izana Measuring Tape' reproduces or measures the values that remain close to the values achieved through established devices/methods. The unique features of Izana Measuring Tapemake it comparatively more applicable, feasible and reliable.Its measurements can be compared with the 3-component or 4-component model data.

Acknowledgments

Remain grateful for your direct or indirect support:

1.World Health Organization
2. Centers for Disease Control and Prevention
3. National Institutes of Health
4. International Society for Clinical Densitometry
5.InBody, ACCUNIQ and OMRON
6. United States National Library of Medicine
7. Indian Council of Medical Research
8. The American Journal of Clinical Nutrition
9. academic.oup.com

10. www.hindawi.com
11. www.journals.elsevier.com
12. onlinelibrary.wiley.com
13. drc.bmj.com
14. journals.sagepub.com
15. Nature journals
16. National Center for Health Statistics

References:

[1]Shadab, KhwajaAhmad (2022). "Measuring Tape That Measures Body Water, Dry Lean Mass, Skeletal Muscle Mass and BMR". International Research Journal of Natural and Applied Sciences. Volume: 9, Issue: 3.
[2]www.inbody.in
[3]Lichtenbelt, W.D.M. et al.(1997). "Deuterium and Bromide Dilution, and Bioimpedance Spectrometry Independently Show That Growth Hormone-Deficient Adults Have an Enlarged Extracellular Water Compartment Related to Intracellular Water". The Journal of Clinical Endocrinology and Metabolism. Volume: 82, Issue: 3, Page: 907-911.
[4]Wang,Zimianet al.(2003). "Total body protein: A new cellular level mass and distribution prediction model". American Journal of Clinical Nutrition. 78(5):979-84.
[5]Hansen, Ross D. et al. (1999). "Determination of skeletal muscle and fat-free mass by nuclear and dual-energy X-ray absorptiometry methods in men and women". American Journal of Clinical Nutrition.70(2):228-33.
[6]Deer, Rachel R. et al. (2020). "Developing a Screening Tool for Sarcopenia in Hospitalized Geriatric Patients: Estimation of Appendicular Skeletal Muscle Mass using Bioelectrical Impedance". ClinNutr. 39(7):2233-2237.
[7]Lee,SeoYoung et al.(2018). "Comparison between Dual-Energy X-ray Absorptiometry and Bioelectrical Impedance Analyses for Accuracy in Measuring Whole Body Muscle Mass and Appendicular Skeletal Muscle Mass".Nutrients. 10, 738.
[8] ncbi.nlm.nih.gov/pmc/article
[9]Tarazi, Robert C. et al. (1969). "Relation of Plasma to Interstitial Fluid Volume in Essential Hypertension". Circulation.Volume XL.