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Anthropometric Profile of Diabetes Mellitus Type 2, Hypertension and Dyslipidaemia in an Outpatient Clinic of a Tertiary Care Hospital in Dehradun

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Abstract:

The approximate prevalence of the metabolic syndrome in patients with coronary heart disease (CHD) is 50%, with a prevalence of 37% in patients with premature coronary artery disease (age 45), particularly in women. With appropriate cardiac rehabilitation and changes in lifestyle (e.g., nutrition, physical activity, weight reduction, and, in some cases, Drugs), the prevalence of the syndrome can be reduced.[1]

It is vital to understand that this measures of humans i.e. anthropometry is infact a function of total fat and its distribution in the body. This logically applies the fact that these measures would be more useful in disorders associated with abnormal fat metabolism and disorders related to its distribution. In the recent times a clustering of such metabolic abnormalities named as metabolic syndrome has emerged as an epidemic. It was described by Revan who described it as syndrome X (1988) and proposed that insulin resistance is a common denominator. He also suggested it as a cluster of metabolic abnormalities including hypoalpha - lipoprotinemia, hypertriglyceridemia, hyperinsulinemia and increased blood pressure.[2]

It has been realized that these body measurement indices vary according to the region, race, geneticmakeup and even with age. Hence the applicability of the above mentioned factors could not be decided and different criteria based on the population based studies were considered.

With the development of imaging techniques to measure centralfat precisely and to distinguish particularly intra-abdominal (visceral) from subcutaneous fat, several studies have shownthat central fat accumulation is predictive of the featuresof the metabolic syndrome.[3]

In clinical and epidemiological studies, obesity is stronglyassociated with all cardiovascular risk factors. However, themechanisms underlying the association between central obesity (particularly visceral obesity) and the metabolic syndrome arenot fully understood and are likely to be complex.

Keywords: Diabetes, Hypertension, Dyslipidemia, Lifestyle diseases, anthropometry.

Introduction

A number of anthropometric measures have been used as approximate measure of obesity for the evaluation of fat tissue accumulation. Obesity measures like waist circumference, body mass index, waist to hip ratio, conicity index, waist stature ratio have been used as risk factor of non-communicable disease like hypertension and dyslipidemia. However, the question regarding the best obesity measure associated with these disorder remain unresolved, one possible reason might be lack of independent comparative studies. Considering all these measures of obesity in search of the best obesity measures. It might be difficult to determine universally applicable best obesity measure associated with hypertension and dyslipidemia due to existence of biological and cultural variations.

Material & Methods

The study was conducted at Himalayan Institute of Medical Sciences, Swami Ram Nagar, Doiwala, Dehradun and included patients attending the medicine out-door and in-patients department. The subjects included patients suffering from Diabetes mellitus type 2, hypertension and dyslipidemia and accordingly, they were divided in group A, B, and C respectively. Group D included subjects having the combination of these three.

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Total no. of eligible patients that reported to the OPD in duration of one year, fulfilling criteria were included in the study as a convenience sampling.

The study also included a control group, which had healthy volunteers not suffering from above mentioned illness. They were matched for age and sex with the study group. The anthropometry profile along the investigations suggestive for these study groups were also conducted for the control group.

Inclusion Criteria:

1. Patient suffering from type 2 Diabetes Mellitus (ANA guidelines),Hypertension (JNC VII) and Dyslipidemia (As per WHO criteria).[4,5]
2. Age above 20 years.
3. Both sexes.

Exclusion Criteria:

1. Type l diabetes mellitus
2. Secondary diabetes mellitus.
3. Any skeletal deformity
4. Age less than 20 years
5. Subject not willing to participate in the study
6. Any subject who is suffering from the systemic illness which is likely to affect the anthropometry and alter the lipid profile were not be included in the study.

Study was conducted over the period of 12 months. A thorough clinical history will be taken in each case with special emphasis on the duration of illness, how detected and any family history, life style, occupation, etc. A thorough clinical examination was done and an informed written consent taken from patient or his/her relative. The various anthropometric measurements included waist circumference, waist to hip ratio and body mass index.

Waist-Circumference: The waist circumference was calculated as an average of one measure taken after inspiration and one taken after expiration at the mid-point between the lower rib and iliac crest.[6]

Participants were asked to remove their outer clothes. The measurer stood at the side of the participant in order to have a clear view of the mirror. Participantwould stand with their feet close together (about 12-15 cm) with their weight equally distributed to each leg. Participantwas asked to breathe normally; the reading of the measurement taken at the end of gentle exhaling. The measuring tape is held firmly, ensuring its horizontal position. The tape should be loose enough to allow the observer to place one finger between the tape and the subject's body.[7]

Waist to hip ratio: Waist to hip ratio was calculated as a ratio of waist circumference to the hip-circumference. The waist-circumference was calculated as mentioned above. The hip-circumference is the circumference measured at the level of Trochanter major.[6]

Body Mass Index (BMI): It is a common measure expressing and calculated as the ratio of weight (in kgs) and square of height (in meters).[6]

The patient should stand straight with heels together, feet angled at about 60°, in bare. With a freestanding device, the person's back should be toward the measuring rod. The subject should look straight ahead positioned in the "Frankfort plane", i.e. where the inferior border of the bony orbit is in line with the groove at the top of the tragus of the ear. Height was recorded to the closest mm. The measurement was repeated three times, and the average used to determine the height at that time to the closest mm.

Findings

The mean age of the subjects in the study groups (Diabetes, hypertension, dyslipidemia) was 52.96± 12.67, there were 78 males and 66 females the weight 79.03±11, mean height 1.62±0.11, BMI 29.76±1.67, WC 99.21±21±7.70, WHR 0.91±0.04. In control group the mean age was 66.7±15.13, there were 10 females and 10 males; the mean weight 70±6.21, mean height 1.68±0.07, mean BMI 25.34±2.04, WC 93.05±7.04, WHR 0.86±0.03. It can be clearly observed that subjects were matched for age & sex. There were 78 males and 66 females in study group with ratio 1:1.2 where as in control 10 male & 10 females respectively 1:1 i.e. ratio. The subjects in two groups were matched for age and sex. The mean BMI in the study group was significantly higher as compared to control group. Likewise other anthropometric measurements like waist circumference and waist to hip ratio were significantly higher as compared to control group.

Table 1: Baseline characteristics of the study group (N= 144)

Parameters	
Mean age (SD)	**59.26 (±12.67)**
Sex	
Males	**78**
Females	**66**
Anthropometry (Mean (±SD)	
Weight	**79.03 (± 11.64)**

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Height (mts)	**1.62 (±0.11)**
BMI	**29.76 (±1.67)**
Waist circumference (cms)	**99.21 (±7.70)**
WHR	**0.91 (±0.04)**

Table 2: Comparison of Anthropometry profile in study groups and control

Anthropometry	Mean values ± SD		P value
	Study Group (144)	Control (20)	
Weight Mean SD	79.03±11.64	70±6.21	< 0.001
Height Mean SD	1.62±0.11	1.68±0.07	< 0.05
BMI Mean SD	29.71±1.67	25.34±2.04	<0.001
WC Mean SD	99.21±7.7	93.05±7.04	< 0.001
WHR Mean SD	0.91±0.04	0.86±0.03	<0.001

Table 2 shows the comparison of anthropometric indices among the study group (n=144) and the controls (n=20) along with their p value respectively against them. All p values are significant meaning thereby the derangement of anthropometric indices noted among the study groups patients against controls

Table 3: Comparison of Anthropometry profile in diabetes and control

Anthropometry	Mean values ± SD		P value
	Diabetes (45)	Control (20)	
Weight Mean SD	74.51±8.81	70±6.21	< 0.05
height Mean SD	1.59±0.09	1.68±0.07	< 0.001
BMI Mean SD	29.22±1.05	25.34±2.04	<0.001
WC Mean SD	97.49±7.31	93.05±7.04	< 0.05
WHR Mean SD	0.90±0.04	0.86±0.03	<0.001

Table 3: shows the comparison of anthropometric indices of diabetic group (n=45) with controls (n=20), shown against them are there p values which are all significant in comparison to control among diabetics.

Table 4 Comparison of Anthropometry profile in patients of hypertension with control

Anthropometry	Mean values ± SD		P value
	HTN (42)	Control (20)	
Weight Mean SD	74.21±9.25	70±6.21	< 0.05
height Mean SD	1.57±0.12	1.68±0.07	<0.001
BMI Mean SD	29.29±1.33	25.34±2.04	<0.001
WC Mean SD	97.0±7.68	93.05±7.04	< 0.05
WHR Mean SD	0.90±0.05	0.86±0.03	<0.001

Table 4 shows the comparison of anthropometric indices among the hypertensive (n=42) and controls (n=20) along with their corresponding p values which are all significant among hypertensives as against controls.

We evaluated 42 hypertensives with the mean age of 58.5± 12.50, 22 male, 20 female (1.1:1). Hence this subgroup was also adjusted for age and sex with control group BMI 29.29±1.33, WC 97.0± 7.68, WHR 0.98±.05. As depicted in table the BMI, WC, WHR are significantly higher in the study group as compared to control group and this associated was stronger for BMI and WHR.

Table 5: Comparison of Anthropometry profile in patients of dyslipidemia with control

Anthropometry	Mean values ± SD		P value
	DYSLIPIDEMICS (17)	Control (20)	
Weight Mean SD	77.06±11.5	706.21	< 0.05
height Mean SD	1.60±0.13	1.68±0.07	<0.05
BMI Mean SD	29.9±1.42	25.34±2.04	<0.001
WC Mean SD	99±7.84	93.05±7.04	< 0.05
WHR Mean SD	0.92±0.05	0.86±0.03	<0.001

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Table 5 shows the comparison of anthropometric indices among dyslipidemia patients (n=17) and the controls (n=20). The respective significant value (p) are shown against them which all are significant among dyslipidemics compared to control.

Table 6: Comparison of Anthropometry profile in patients of diabetes, hypertension and dyslipidemia with control

Anthropometry	Mean values ± SD		P value
	HTN + DM + DYSL (11)	Control (20)	
Weight Mean SD	87.27±7.76	70±6.21	< 0.001
height Mean SD	1.71±0.064	1.68±0.07	>0.05
BMI Mean SD	29.93±1.41	25.34±2.04	<0.001
WC Mean SD	105.27±6.76	93.05±7.04	< 0.001
WHR Mean SD	0.92±0.028	0.86±0.03	<0.001

Table 6 shows the comparison of anthropometry of patients suffering from diabetes, hypertension and dyslipidemia (n=11) with controls (n=20). The mean height of patient was noted to be not significant as compared to controls (p>0.05).

Discussion

Because of the unique localization of Himalayan Institute of Medical Sciences it caters to the population of both hilly region and the plains. This mixed population have extremes of life style ranging from sedentary workers to the people walk in the hilly region many kilometers per day. So, it is difficult to predict the significance of these anthropometric parameters in this subset of population. Also primarily no pioneer study has been conducted to evaluate the anthropometry of the normal population in the hills and the plains. Once, there is a data base for anthropometry of the normal population, comparisons can be made with respect to various disorders included in the study.

The step was to analyze group D which is a heterogeneous group comprising of a combination of disease considered in the study. However in some of these groups, numbers are small to have any statistical significance. Yet the trend can be observed that and there was significant difference (p value) in the study group and control. The mean BMI in hypertension and dyslipidemia was 32.22±1.51 where as in dyslipidemics, the value of mean BMI was 29.9±1.42. The waist circumference with the hypertension and dyslipidemia group was 102.33±3.88 whereas in plain dyslipidemia WC is 99±7.84. Likewise WHR in plain dyslipidemia 0.92±0.005 whereas the combined group mean WHR 0.94±0.03.

Limitation of study: Although every effort was made not to include disorder which are likely to alter anthropometry, yet the medication and life style changes adopted by these subjects are likely to alter anthropometry. Secondly the control group is neither on any medication nor have been evaluated for any life style changes. This can confound the results. Thirdly the data used in the subgroups is a combination of both sexes, the anthropometry on the basis of sexes have not been studied. The sensitivity of various anthropometric measures may vary for different sexes.

Conclusions

BMI, WHR, and WC are increased in diabetics, hypertensives and well as dyslipidemics as compared to control.The mean BMI, WHR and WC was significantly higher in study group as compared to controls.The WHR and BMI had stronger association and predictive value diabetics, hypertensives and well as dyslipidemics in comparison to WC.

The subjects having diabetes, hypertension and dyslipidemia had a higher BMI, WC, WHR as compared to control. However, there appears to be no linear co-relation of anthropometric parameter when two or more than two of these disorders were present in the same subjects.

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