Anthropometric and body compositional changes among adult women with aging

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ABSTRACT
The aim of the present study was to analyze the anthropometric changes among adults with age. A total of 2000 women categorized in four age groups: 20-30, 31-40, 41-50, and 51-60 years were examined. The following anthropometric variables were assessed: body circumferences (Mid upper arm circumference, Waist circumference, Hip circumference, Thigh circumference, Calf circumference), Skin fold thickness (Biceps, Triceps, Subcapular, Suprailiac) Body mass index, Per cent body fat, Fat mass, Fat free mass, Fat mass index, Fat free mass index. Waist-hip ratio, mid upper arm muscle area and mid upper arm fat area. It was found that after the age of 30 years Body mass index, Per cent body fat, Skin fold thicknesses and fat mass increased while muscle mass decrease. These changes indicate the increased susceptibility of women for different health problem. As the age progresses fat mass increased continuously.

Key Words : Anthropometric, Adult women, Biceps, Triceps, Waist-hip ratio

INTRODUCTION
“Morphological and body structural changes in humans occurs over their life time. In the human body, there are many physical changes seen at every stage of life. Although every person experiences a unique pattern of growth and development but during early stages of life these changes are known as growth and development (Das and Roy, 2010). Generally, physical dimensions are at peak from age 20 to 35 years between the late teen and third decade of life. In this stage a maximum level attained by the physiological capacity of various systems. Physiological functions start to decline after 35 years at different rates in different people (Jagga et al., 2011).

During adulthood all vital organs begin to lose some functions. All body cells, tissues and organs, have age changes which affect the functioning of all body systems. During this phase, every cell experiences changes. They become larger and are less able to divide and multiply. Organs also change due to cell and tissue resulted in slowly start to lose function (http:\www.ncbi.nlm.nih.gov/pmc/articles/PMC4410392).

Human body is composed of minerals, fat, water and proteins. Body can be divided into two components; fat and fat free mass (Pietrobelli et al., 2001). There is an accumulation of

fat and a substantial loss of muscle mass as the age increases. Degree and rate of loss vary broadly and are dependent on genetic and lifestyle influence (Silawat et al., 2009). After the age of 35, there is continuous quantitative and qualitative reduction of skeletal muscle mass and fat redistribution in the body. Reduction in muscle mass occurs with greater accumulation of fat in the intra abdominal region. Although there is no significant changes in body mass index (Almeida et al., 2013). Major compositional changes occur in the proportion of these components during adulthood and these changes also affect the anthropometric dimensions of the body. In different individuals, Environmental factors play a significant role in the entire process (Rolland et al., 2008).

Age process brings changes in body composition. These changes include mainly fat accumulation, redistribution of fat, loss of muscle cells in the body which result in obesity, cardiovascular diseases, Osteoporosis and other health problems. These compositional components are modifiable. Now a days, change in lifestyle and other different environmental factors like dietary intake, exercise etc. can affect the changes in body composition and also can affect the incidence of different diseases which start with adulthood. So the present study is focused is on to find out the body composition and anthropometric changes in different ages in adult women.”

**METHODOLOGY**

The present study was conducted in the urban areas Baghpat district (Uttar Pradesh). For the study 2000 women age between 20 to 60 years were selected. All 2000 individuals were from four age groups and these age groups were 21 to 30 years (group 1), (group 2) 31 to 40 years, 41 to 50 years (group 3) and 51-60 years (group 4). Sample selection was done in such way so that each category should have at least 500 samples for making even sample distribution in all groups. Information on about age, occupation and educational status was obtained from all subjects with the help of a questionnaire.

**Anthropometric measurements :**

“All anthropometric measurements were taken by using internationally accepted standard protocols (Lohman et al., 1988).

**Weight :**

The body weight was taken with an electronic weighing machine, asking the subject to stand on it bare foot with an erect posture and light apparel. The weighing machine was calibrated time to time with a known standard weight. No deduction was made for the weight of light apparel while taking the final reading. Body weight was measured to nearest 0.1 kg.

**Height :**

Height was measured to the nearest 0.5 cm on stadiometer. Subjects stood with their scapula, buttocks and heels resting against a back wall of stadiometer, the neck was held in a natural non stretched position, the heels were touching each other, the toe tips formed a 45° angle and the head was held straight with the inferior orbital border in the same horizontal
plane as the external auditive conduct (Frankfort’s plane).

**Skinfold-thicknesses :**

Skinfold-thickness measures were made on the left side of the body using a Harpenden’s skin fold caliper to the nearest 0.5 mm. vertical triceps skin fold thickness halfway between the acromion and olecranon processes, Vertical biceps skin fold thickness at the same level as the triceps skin fold thickness above the antecubital fossa, Sub scapular skin fold thickness just below the inferior tip of the scapula, suprailiac skin fold thickness as an oblique fold on the iliac crest in the midaxillary line.”

**Body circumferences :**

*Mid upper arm circumference (MUAC) :*

“The measurement was taken with the help of a flexible steel tape at the middle (midway between acromion and elbow) part of the left upper arm on the naked skin while the arms were hanging at the sides of the body.

*Waist circumference (WC) :*

WC was measured to the nearest 1 mm, midway between the lower rib margin and the iliac crest, using fiber glass tape. WC was measured with the subjects standing and classified according to WHO criteria. < 80(cms) - Normal, 80-88 (cms) - Increased susceptibility for metabolic disorders and >88 (cms) -High risks for metabolic disorders.

*Hip circumference :*

Hip circumference (HC) was measured, using the same tape measure, to the nearest 1mm at the widest point between the hip and buttocks. When the subject exhaled normally.

*Thigh and calf circumference :*

Mid thigh at the level halfway between the top of the patella and the inguinal crease, and Calf at the largest circumference between the knee and the ankle malleoli.”

**Anthropometric indices :**

Body mass index (BMI), Waist – hip ration (WHR), Per cent body fat (%BF), Fat mass (FM) and Fat mass index (FMI), Fat free mass (FFM) and Fat free mass index (FFMI), Mid upper arm muscle area (MUAMA), and Mid upper arm fat area (MUFAA).

**Body mass index :**

“BMI was calculated by dividing body weight (kg) by height$^2$ (m) [20]. Individuals were considered under nourished if their BMI was less than 18.5, normal from 18.5 to 24.9 and overweight if $\geq$ 25 [21]. BMI: Weight (kg) / Height (m$^2$) (WHO, 1995). The following cut-off points were used: Under nutrition: BMI < 18.5, Normal: BMI: 18.5-24.9, Overweight: BMI > 25.0, 30.0–34.9 Obesity I, 35.0–39.9 Obesity II and 40.0 (and above) Obesity III.”

**Waist hip circumference ratio :**

“This was estimated by dividing waist circumference by hip circumference. The threshold
WHR was = 0.85 for women, above which superior distribution of adipose tissue was considered (WHO, 2008).

< 0.85 Normal, >0.85 Higher (abdominal obesity).”

“Anthropometric measurements were used to estimate the body composition (FM and FFM), using the prediction equations of Durnin and Womersley (1974) and Siri (1961) based on age, weight, height, and skinfold thickness. Body density was calculated according to Durnin and Womersley formula, which was in turn used to estimate the per cent body fat.

Body density = 1.1369-(0.0598×log sum of 4 SFTs)

% PBF = (554.8/density) – 500.4

Fat mass (FM), fat free mass (FFM), fat mass index (FMI) and fat free mass index (FFMI) were computed using following standard equations.

Fat mass (FM, Kg) = Body Weight (Kg) x [PBF/ 100] (van Itallie et al., 1990).

Fat mass index (FMI, Kg / m²) = [FM (Kg) / Height² (m²)] (van Itallie et al., 1990).

Fat free mass (FFM, Kg) = [Body Weight (Kg) - FM (Kg)] (Lohman, 1992).

Fat free mass index (FFMI, Kg / m²) = [FFM (Kg) / Height² (m²)] (Heymsfield et al., 1996).

Mid-upper arm muscle area (MUAMA) and mid-upper arm fat area (MUFAA) were calculated using the following equations (Gibson 1990).”

\[
\begin{align*}
\text{MUAMA} &= \frac{\text{MUAC} - (\pi \times \text{TSK})^2}{4\pi} \\
\text{MUFAA} &= \frac{\text{TSK} \times \text{MUAC} - (\pi \times \text{TSK})^2}{4}
\end{align*}
\]

RESULTS AND DISCUSSION

Body weight:

Mean body weight of group 1 (20-30 years) was 58.78±8.22 kg. It was significantly lower than the mean body weight of age group 2 (30-40), group 3 (41-50), group 4 (51-60) where mean body weight were 63.06±10.51, 63.57±10.04, 63.18±9.87 kg, respectively. There was no significant difference was observed between the group 2, 3 and 4. Increase in body weight may be due to increase in fat mass in the body.

Body mass index (BMI) :

Mean BMI of group 1 (20-30 years) was 23±3.43, it was significantly lower than the other three groups and was normal. Mean BMI of age groups 30-40, 41-50 and 51-60 years were 25.85±3.25, 26.00±3.62 and 25.59±3.47, respectively and not significantly different from each other. After analyzing BMI, in age group (21-30 years) numbers of normal adult women were 355(71%), numbers of under nourished adult women were 24(4.8%), 119(23.8%) women were in the category of obesity 1, and 3(0.6%) females were in obesity 2 category. In age group (31-40 years) numbers of normal adult women were 227 (45.4%) number of under nourished adult women were 22(4.4%), numbers of overweight adult women were 181(36.2%), 57(11.4%) women were in obesity 1 and 13(2.6%) women found to be obesity 2 categories. In age group (41-50 years) numbers of normal adult women were 233(46.6%),
numbers of under nourished adult women were 24 (4.8%), numbers of overweight adult women were 176 (35.2%), 58 (11.6%) women were in obesity 1 and 9 (1.8%) women were in obesity 2 category. In age group (51-60 years) numbers of normal adult women were 2245.2%), numbers of overweight adult women were 182 (36.4%), 55 (11%) women were in obesity 1, 13 (2.6%) women were found to be obesity 2 and 24 (4.8%) were in obesity 3 categories.

**Per cent body fat (%BF):**

High per cent body fat is the true indicator of obesity. According to WHO a person having per cent body fat >30 is called obese. Mean per cent body fat of age group (20-30 years) was 43.25±2.15%. It was significantly lower than the mean body weight of age group 2 (30-40 years), group 3(41-50 years), group 4 (51-60 years) where mean body weight were 45.32±1.85, 45.23±2.02, 45.25±2.012%, respectively. Although mean per cent body fat of each age group was higher than 30%. But the mean per cent body fat of age group 20-30 years was significantly lower than the other three groups. Although there was no significant difference was observed between the per cent body fat other three groups.

**Fat mass (FM) and Fat mass index (FMI):**

Mean FM and FMI of age group 1 (20-30 years) were 25.44±4.39 and 9.99±1.87 (kg), respectively. It was significantly lower than the mean FM and FMI of age group 2 (30-40 years), group 3(41-50 years), group 4 (51-60 years) where mean body weight were 33.31±4.42 and 13.07±1.82 (kg), respectively.

<table>
<thead>
<tr>
<th>Variables</th>
<th>20-30 years (group 1)</th>
<th>31-40 years (group 2)</th>
<th>41-50 years (group 3)</th>
<th>51-60 years (group 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body weight(kg)</td>
<td>58.78±8.22</td>
<td>63.06±10.51</td>
<td>63.57±10.04</td>
<td>63.18±9.87</td>
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<tr>
<td>Height (cms)</td>
<td>160±7.19</td>
<td>159±6.99</td>
<td>159±6.90</td>
<td>159±6.78</td>
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<tr>
<td>BMI (kg/m²)</td>
<td>23.43±3.43</td>
<td>25.85±3.25</td>
<td>26.00±3.62</td>
<td>25.59±3.47</td>
</tr>
<tr>
<td>PBF (%)</td>
<td>43.25±2.15</td>
<td>45.32±1.85</td>
<td>45.23±2.02</td>
<td>45.25±2.012</td>
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<tr>
<td>FM (kg)</td>
<td>25.44±4.39</td>
<td>28.74±5.62</td>
<td>29.11±4.56</td>
<td>28.84±5.38</td>
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<tr>
<td>FMI (kg/m²)</td>
<td>9.99±1.87</td>
<td>11.36±6.71</td>
<td>11.58±5.71</td>
<td>11.73±4.33</td>
</tr>
<tr>
<td>FFM (kg)</td>
<td>33.31±4.42</td>
<td>34.34±5.2</td>
<td>33.22±7.23</td>
<td>34.80±4.90</td>
</tr>
<tr>
<td>FFMI(kg/m²)</td>
<td>13.07±1.82</td>
<td>13.60±2.22</td>
<td>15.01±5.46</td>
<td>13.43±2.31</td>
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<tr>
<td>MUAC(cms)</td>
<td>30.07±2.20</td>
<td>30.30±2.10</td>
<td>30.55±2.08</td>
<td>30.56±2.55</td>
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<td>MUAMA(cm)²</td>
<td>40.5±7.1</td>
<td>37.7±7.46</td>
<td>37.90±7.22</td>
<td>38.62±7.22</td>
</tr>
<tr>
<td>MUAFÁ (cm)²</td>
<td>38.39±14.35</td>
<td>35.61±5.83</td>
<td>35.98±6.25</td>
<td>35.98±6.27</td>
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<tr>
<td>Waist circumference (cms)</td>
<td>76.95±4.06</td>
<td>82.70±5.36</td>
<td>84.23±6.48</td>
<td>85.07±6.31</td>
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<tr>
<td>Hip circumference (cms)</td>
<td>83.78±5.55</td>
<td>93.75±8.11</td>
<td>95.57±10.02</td>
<td>96.20±9.32</td>
</tr>
<tr>
<td>Waist-Hip ratio</td>
<td>0.91±0.044</td>
<td>1.06±4.02</td>
<td>0.88±0.046</td>
<td>0.88±0.044</td>
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<tr>
<td>Biceps (mm) SFT</td>
<td>22.91±3.67</td>
<td>25.85±3.24</td>
<td>26.00±3.62</td>
<td>25.59±3.47</td>
</tr>
<tr>
<td>Triceps (mm) SFT</td>
<td>23.99±3.66</td>
<td>25.85±3.24</td>
<td>26.00±3.62</td>
<td>26.79±3.69</td>
</tr>
<tr>
<td>Subcapular (mm) SFT</td>
<td>16.90±3.26</td>
<td>21.75±2.92</td>
<td>21.75±3.94</td>
<td>21.91±3.66</td>
</tr>
<tr>
<td>Suprillc (mm) SFT</td>
<td>24.65±8.69</td>
<td>26.94±3.98</td>
<td>27.48±4.77</td>
<td>27.16±4.26</td>
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<td>Thigh circumference (cms)</td>
<td>48.29±3.58</td>
<td>49.45±2.54</td>
<td>49.47±2.58</td>
<td>49.47±2.39</td>
</tr>
<tr>
<td>Calf circumference (cms)</td>
<td>33.75±1.71</td>
<td>36.32±7.22</td>
<td>33.75±1.77</td>
<td>34.41±2.31</td>
</tr>
</tbody>
</table>
years), age group 3 (41-50 years), age group 4 (51-60 years) where mean FM and FMI were 28.74±5.62, 29.11±5.46, 28.84±5.38 (kg) and 11.36±5.71, 11.58±2.37, 11.73±2.43 (kg), respectively. Although there was non significant difference the fat mass of rest three groups. Same observations were observed in FMI.

**Fat free mass (FFM) :**
Mean FFM of age group 1 (20-30 years) was 33.31±4.42 (kg). It was significantly lower than the mean FFM of age group 2 (30-40 years), age group 3 (41-50 years), age group 4 (51-60 years) where mean FFM were 34.34±5.2, 33.22±7.23 (kg) and 34.80±4.90 (kg), respectively. There was non significant difference was observed between the age group 1 and 3 and 2 and 4.

**Fat free mass index (FFMI) :**
Mean FFMI of age group 1 (20-30 years) was 13.07±1.82 (kg). It was significantly lower than the mean FFMI of age group 2 (30-40 years), age group 3 (41-50 years), age group 4 (51-60 years) where mean FFMI were 13.60±2.22, 15.01±5.46 (kg) and 13.43±2.31 (kg), respectively. Although there was significant difference was observed in except one group 3 and 4.

**Mid upper arm circumference (MUAC) :**
Mean MUAC of age group 1 (20-30 years) was 30.07±2.20 cms. It was significantly

<table>
<thead>
<tr>
<th>Variables</th>
<th>1 vs.2</th>
<th>1 vs.3</th>
<th>1 vs.4</th>
<th>2 vs.3</th>
<th>2 vs.4</th>
<th>3 vs.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI (kg/m²)</td>
<td>13.42*</td>
<td>13.48*</td>
<td>11.83*</td>
<td>.670**</td>
<td>1.250**</td>
<td>1.834**</td>
</tr>
<tr>
<td>PBF (%)</td>
<td>16.29*</td>
<td>16.46*</td>
<td>15.19*</td>
<td>.861**</td>
<td>.559**</td>
<td>1.363**</td>
</tr>
<tr>
<td>FM (kg)</td>
<td>12.27*</td>
<td>11.58*</td>
<td>10.82*</td>
<td>1.073**</td>
<td>.297**</td>
<td>.796**</td>
</tr>
<tr>
<td>FMI (kg/cm²)</td>
<td>10.08*</td>
<td>11.66*</td>
<td>12.60*</td>
<td>1.426**</td>
<td>2.413**</td>
<td>1.005**</td>
</tr>
<tr>
<td>FFM (kg)</td>
<td>3.342*</td>
<td>.253**</td>
<td>5.036*</td>
<td>4.052*</td>
<td>1.457**</td>
<td>4.052*</td>
</tr>
<tr>
<td>FFMI (kg/m²)</td>
<td>4.153*</td>
<td>7.532*</td>
<td>2.747*</td>
<td>5.984*</td>
<td>3.370*</td>
<td>1.206**</td>
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<tr>
<td>MUAC (cms)</td>
<td>1.672**</td>
<td>3.528*</td>
<td>3.250*</td>
<td>1.887**</td>
<td>1.769**</td>
<td>.080**</td>
</tr>
<tr>
<td>MUAMA (cm)</td>
<td>6.175*</td>
<td>5.827*</td>
<td>3.163*</td>
<td>2.958*</td>
<td>3.370*</td>
<td>.442**</td>
</tr>
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<td>MUFAA (cm)</td>
<td>.416**</td>
<td>.361**</td>
<td>.361**</td>
<td>.966**</td>
<td>.966**</td>
<td>.000**</td>
</tr>
<tr>
<td>Waist circumference (cms)</td>
<td>19.13*</td>
<td>21.30*</td>
<td>24.18*</td>
<td>4.069*</td>
<td>6.396*</td>
<td>2.075**</td>
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<tr>
<td>Hip circumference (cms)</td>
<td>22.65*</td>
<td>22.99*</td>
<td>25.55*</td>
<td>3.150*</td>
<td>4.420*</td>
<td>1.025**</td>
</tr>
<tr>
<td>W-H (cm)</td>
<td>.807**</td>
<td>11.84*</td>
<td>11.09*</td>
<td>1.003**</td>
<td>.979**</td>
<td>.995**</td>
</tr>
<tr>
<td>Biceps (mm)</td>
<td>13.41*</td>
<td>13.38*</td>
<td>11.84*</td>
<td>.670**</td>
<td>1.250**</td>
<td>1.827**</td>
</tr>
<tr>
<td>Triceps (mm)</td>
<td>15.16*</td>
<td>14.63*</td>
<td>11.99*</td>
<td>.313**</td>
<td>2.877**</td>
<td>3.025**</td>
</tr>
<tr>
<td>Subcapular (mm)</td>
<td>24.70*</td>
<td>22.54*</td>
<td>22.79*</td>
<td>.010**</td>
<td>.772**</td>
<td>.721**</td>
</tr>
<tr>
<td>Suprilic (mm)</td>
<td>5.343*</td>
<td>6.376*</td>
<td>5.769*</td>
<td>1.947**</td>
<td>.819**</td>
<td>1.144**</td>
</tr>
<tr>
<td>Thigh circumference (cms)</td>
<td>5.867*</td>
<td>5.959*</td>
<td>6.1068*</td>
<td>.145**</td>
<td>.155**</td>
<td>.004**</td>
</tr>
<tr>
<td>Calf circumference (cms)</td>
<td>7.725*</td>
<td>5.078*</td>
<td>3.204*</td>
<td>6.70*</td>
<td>8.38**</td>
<td>1.744**</td>
</tr>
</tbody>
</table>

Significant * P < 0.05 NS=Non-significant P < 0.05

Table 2: t test value between of selected anthropometric characteristics of different age group females

lower than the mean MUAC of age group 2 (30-40 years), group 3 (41-50 years), group 4 (51-60 years) where mean MUAC were 30.30±2.10, 30.55±2.08, 30.56±2.55 cms, respectively. There was significant difference was observed in 2, 3 and 4.

**Mid upper arm muscle area (MUAMA) and Mid upper arm fat area (MUFA):**

Mean MUAMA and MUFA of age group 1 (20-30 years) was 40.5±7.1 and 38.39±149.35 (cm), respectively. It was significantly higher than the mean MUAMA and MUFA of age group 2 (30-40 years), age group 3 (41-50 years), age group 4 (51-60 years) where mean MUAMA and MUFA were 37.7±7.46, 37.90±7.22, 38.62±7.22 (cm) and 35.61±5.83, 35.98±6.25, 35.98±6.27 (cm), respectively. Although there was significant difference was observed in MUAMA except one group 3 and 4 and no significant difference was observed in MUFA in 1, 2, 3 and 4 groups.

**Waist circumference (WC):**

Mean WC of age group (20-30 years) was 76.95±4.06 (cms). It was significantly lower than the mean WC of age group 2 (30-40 years), group 3 (41-50 years), group 4 (51-60 years) where mean WC were 82.70±5.36, 84.23±6.48, 85.07±6.31 (cms), respectively. There was non significant difference was observed between age group 3 and 4 and significant difference was observed between the rest three groups. WC of women of age group (20-30 years) are as follows <80, 80-88 and >88 were 440 (88%), 52 (10.4%) and 8 (1.6%), respectively. Number of women of age group (31-40 years) classification as <80, 80-88 and >88 cms was 217 (43.4%), 214 (42.8%) and 69 (13.8%), respectively. Number of adults women of age (41-50 years) in <80, 80-88 and >88 cms classification were 177(35.4%), 179(35.8%) and 144 (28.8%), respectively. Number of women of age group (51-60 years) in <80, 80-88 and >88 were 133(26.6%), 205 (41%) and 162 (32.4%), respectively.

**Waist- hip ratio (WHR):**

Mean WHR of age group 2 (30-40 years) was 1.06±4.02. It was significantly higher than the mean WHR of age group 1 (20-30), group 3 (41-50), group 4 (51-60) where mean WHR were 0.91±0.044, 0.88±0.046, 0.88±0.044, respectively. There was significant difference was observed in 1, 3 and 4.

**Skin fold thickness:**

**Biceps:**

Mean biceps of age group (20-30 years) was 22.91±3.67 (mm). It was significantly lower than the mean biceps of age group 2 (30-40 years), age group 3 (41-50 years), age group 4 (51-60 years) where mean biceps were 25.85±3.24, 26.00±3.62, 25.59±3.47 (mm), respectively. There was no significant difference was observed in age group 2, 3 and 4.

**Triceps:**

Mean triceps of age group (20-30 years) was 23.99±3.66 (mm). It was significantly lower than the mean biceps of age group 2 (30-40 years), age group 3 (41-50 years), age group 4 (51-60 years) where mean biceps were 27.45±3.52, 27.52±3.94, 26.79±3.69 (mm), respectively.
respectively. There was no significant difference was observed in age group 2 and 3.

**Subcapular**:
Mean subcapular of age group 1 (20-30 years) was 16.90±3.26 (mm). It was significantly lower than the mean subcapular of age group 2 (30-40 years), age group 3 (41-50 years), age group 4 (51-60 years) where mean subcapular were 21.75±2.92, 21.75±3.94, 21.91±3.66 (mm), respectively. There was no significant difference was observed in age group 2, 3 and 4.

**Suprailic**:
Mean suprailic of age group (20-30 years) was 16.90±3.26 (mm). It was significantly lower than the mean biceps of age group 2 (30-40 years), age group 3 (41-50 years), age group 4 (51-60 years) where mean suprailic were 21.75±2.92, 21.75±3.94, 21.91±3.66 (mm), respectively. There was no significant difference was observed in age group 2, 3 and 4.

**Thigh and calf circumference**:
Mean Thigh and Calf circumference of group (20-30 years) was 48.29±3.58 and 33.75±1.71 (cms). It was significantly lower than the mean Thigh and Calf of age group 2 (30-40 years), group 3 (41-50 years), group 4 (51-60 years) where mean Thigh and Calf were 49.45±2.54, 49.47±2.58, 49.47±2.39 and 36.32±7.22, 33.75±1.77, 34.41±2.31 (cms), respectively. Although there was non significant difference was observed in 2, 3 and 4 age groups in thigh circumference and in calf circumference non significant difference was observed in 3 and 4 age groups.”

**Discussion**:
“Individuals reach physical maturity through growth and development at certain age, but the age of maturity of all the body components is not similar between individuals or populations. It is inevitable that after middle age the changes in physical characteristics are marked and show declining trend. Present study examines age related anthropometric and body compositional changes among women. It was seen that 20-30 years age group had lower BMI, Per cent body fat, Waist circumferences, Skin fold thicknesses and fat mass than other three groups but high muscle mass major changes were seen after the age group 30 years. Most other anthropometric characteristics reached its peak at 30-40 weight, biceps, suprailliac, abdominal and thigh circumference and few other characteristics reached its peak at 40-50 yrs. anthropometric characteristics show an increasing trend in fat deposition with the increment of age. Anthropometric measurements and indices indicate high fat deposition in body after the age of 30 years. Which can make the females susceptible for different health problems.”

**REFERENCES**


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