ASSESSMENT OF BODY MASS INDEX AND RESTING METABOLISM OF MALE SEDENTARY AND ACTIVE OLDER ADULTS OF PUNJAB, INDIA

INTRODUCTION

In the elderly population would be beneficial to have a body composition measure beyond body mass index to use predict body fat percentage/obesity/lean tissue mass. BMI increases with aging and is applied as a beneficial population-level assessment of obesity and overweight. The ability of body mass index to predict adiposity (RANASINGHE et al, 2013). The physical activity (PA) of the older adults in the group was very lesser, much lesser than in persons of the same or equal age but with correct BMI. The reduced level of PA time or free time PA (ZBRONSKA, MĘDRELA-KUDER, 2018).

The Body mass index (BMI) PA level was significantly related to cognitive marks in univariate analysis. Evaluated with subjects with moderate physical activity (MPA) levels and subjects with low physical activity (LPA) levels had lesser scores (HUANG et al. 2018).

The older adult’s population of the physical activity (PA) was smaller and the active energy expenditure (AEE) was lesser than in the case of the youngest population. Both groups had the sedentary energy expenditure (SEE) and the lying period at the same or equal level. In this study, the better time devoted in light intensity activity (LIA) and lesser sedentary times were related to a lesser body mass index. Outcomes are reliable with the supposition that substituting sedentary or inactive activities with light intensity activities could lead to lesser BMI or body mass index levels and obesity prevalence between the populations of older adults (BANN et al. 2015).

Senior citizens are the population subcategory attractive in the maximum levels of sedentary time (WULLEMS et al, 2016) and the lowermost levels of physical activity (SUN et al. 2013). Several studies containing senior citizens from various regions evaluating physical activity, sedentary time, weight results, and nutritional consumption should be encouraged. Such studies are compulsory to enhance the suggestions concerning sedentary time and physical activity in older adults in light of avoiding overweight and obesity (VAN-DYCK, 2020).

The total and the sort of food consumed has an effect on (RM) resting metabolism. The caloric restriction impact on RM is well-researched and crystal clear. Severe caloric limit reductions RM (BROWNELL et al, 1987; APFELBAUM et al, 1971; BRAY 1969; MOLE et al, 1989). The reason for that is that RM signifies the highest or extreme percentage of daily caloric expenditure in lazy people.

Scientist assume that this decrease in resting metabolism (RM) the body’s protective response to energy restrictions. Conversely, excessive food ingestion and calories outcomes in an elevation of RM (APFELBAUM et al, 1971). The mentioned elevation has been observed as protection against a rise or extreme in the body’s “natural weight” (POEHLMAN 1989; BROWNELL et al, 1987).

The older adults may be less economical than young and middle-aged adults (ROBINSON et al,1976; ROWLAND et al, 1988; MORGAN et al, 1989; DANIELS 1985; ADAMS et al, 1972; ROWLAND, GREEN 1988; ROWLAND et al. 1987). Bar-Or (1983) mentions that the variation in resting metabolism is solely 1-2 mL Kg-1 min -1 and, even though this value describes a 25-35% higher BMR in children compared to adults, it is doubtful to be accountable for all variation in submaximal exercise values (ROBERT, SCOTT 2000).
Resting metabolism (RM), which interpretations for ∼60-75% of everyday energy expenditure, reductions with age in female (FUKAGAWA et al, 1990; VAUGHAN et al, 1990) and is thought to play an essential role in the age-related rises in body weight (BW) and fatness or obesity. The element that persons with low resting metabolism are at better risk for upcoming weight increase than those with high resting metabolism (RAVUSSIN et al, 1988) is reliable with this conception. Our outcomes are reliable with the conception that the age-related deterioration in resting metabolism in sedentary females is not observed in the females who regularly perform endurance or prolonged activity. The important level of resting metabolism perceived in middle-aged and senior citizens exercising females may play a part in their lesser levels of body weight (BW) and fatness or obesity compared to those in sedentary females (RACHAEL et al, 1997).

It is generally found in most of the studies that changes in body mass index and resting metabolism are due to alternations in moderate or vigorous-intensity aerobic physical activity. This study aimed to assess the body mass index and resting metabolism of male sedentary and active older adults.

MATERIALS AND METHODS

Subjects
The survey was carried out with the aim of investigating the assessment of body mass index and resting metabolism of male sedentary and active older adults of Punjab, India. The study was conducted on male sedentary and active older adults; the age level was divided into three categories of sedentary and active older adults of Punjab, India i.e. male of 60-70, 71-80, and 81-90 years respectively. Participants (N=180) male sedentary and active older adults from Punjab were chosen to serve as the current study subjects.

Table 1. showing category, age group, and numbers of subjects selected for the study

| SEDENTARY GROUP | (Age group level) | (N=90) | ACTIVE GROUP | (Age group level) | (N=90) |
|-----------------|-------------------|--------|--------------|-------------------|--------|
|                 | 60-70 Years       | (N=30) | 60-70 Years  | (N=30)            |
|                 | 71-80 Years       | (N=30) | 71-80 Years  | (N=30)            |
|                 | 81-90 Years       | (N=30) | 81-90 Years  | (N=30)            |

Source: Search data.

The following two modules of body composition variables were selected for the current study body mass index and resting metabolism.

Body mass index (BMI) is a ratio of the sum of total body weight (BW) to height (H). Some ratios have been suggested, but the one used most frequently is the weight (in kilograms) divided by height (in meters) squared [WT/HT²(Kg m⁻²)] (BRODIE 1988A; REVICKI, ISRAEL 1986) this ratio is also called the Quetelet index. BMI = body mass (kg) / Body height (m)². (World Health Organization 1988) assumed BMI standards of < 18.5 for Underweight, and 18.5 -24.9 for normal or healthy weight, 25-29.9 for overweight, and >30 for obesity. Obesity was further divided into three classes. Class, I obesity is showed by a BMI of 30-34.9, Class II by a BMI of 35-39.9, and Class III by a BMI > 40.

Resting metabolism is defined as the energy consumed when a person is resting quietly in a supine position. Resting metabolic rate used largely but not absolutely (BURSZTEIN et al, 1989). The resting metabolism (RM) of adult men average between 1500 and 1800 kilocalories per day and the resting metabolism of adult women averages between 1200 and 1450 kilocalories per day (BURSZTEIN et al, 1989; BOGERT et al, 1973). RM = 88.362+ [4.799 X Height (cm)] + [13.397 X Weight (kg)] -5.677 X Age (years).

A sedentary daily life is a part of a lifestyle with no physical activity or exercise. A sedentary lifestyle or life is often sitting or lying down or prone or supine position while involved in exercises like reading, watching television (WT), playing video games (PVG), and using the computer for much of the day (Sedentary Lifestyle 2018). An active lifestyle is a product of
physical activity or exercise and leisure activities that are aimed at the overall population to inspire a healthier life (Active Living 2012). World Health Organization 2020 defines physical activity as any bodily movement produced by voluntary muscles that need energy. PA defines all bodily movement containing during free time. Both moderate- and vigorous-intensity PA enhances health. It also benefits avoid hypertension, maintains healthy body weight (BW).

Self- Reported Questionnaire
A self-reported questionnaire as per WHO guidelines was constructed to identify the sedentary and active type of individuals. The questionnaire includes several types of questions related to types of activity performed i.e. moderate-intensity aerobic physical activity e.g. walking, brisk walking, and other activities of gardening 150 minutes/week or vigorous-intensity aerobic physical activity e.g. jogging, running, dancing, bicycle riding, aerobics exercise/gym, some yoga exercises, stretching exercises and calisthenic exercises 75 minutes/week or an equal combination of moderate- and vigorous-intensity activity throughout the week. Respondents were questioned to mark (yes or no). The overall responses were analyzed to classify the type of individuals as per their activity type performed and were classified accordingly.

Measures
Body mass index and resting metabolism of male sedentary and active older adults of Punjab, India was assessed by body composition monitor OMRON (HBF -212). A body composition monitor is used to measure the body mass index and resting metabolism. This test has performed in the standing position. Participants should be barefooted while measuring the body mass index and resting metabolism. Participants should not wear shoes and socks. Position while measuring the body mass index and resting metabolism should be precise like heels should be on heel panel of body composition monitor.

Statistical Technique
Statistical package for social science (SPSS) version 23 was applied to investigate the body mass index and resting metabolism of male sedentary and active older adults, after collecting data one-way ANOVA (Analysis of Variance) was substantial, least significant difference (LSD) post hoc analysis to discover individual group differences test were utilized (P<0.05).

RESULTS
Based on the findings of the current study, the following results were drawn among three different age levels of male sedentary and active older adults of Punjab, India. The results strongly confirm that significant differences were observed among three different age levels of male sedentary and active older adults of Punjab, India: 60-70, 71-80 and, 81-90 for their body mass index (BMI). It is apparent from table 2. (b) that the outcomes of the investigation of variance (ANOVA) amongst three different age levels of the male sedentary and active older adults of Punjab; 60-70, 71-80 and, 81-90 on body mass index were discovered to be statistically significant (P>0.05). Because the acquired “F” ratio 2.677* (0.02) respectively was discovered statistically significant.

A glance at figure 2 (a) that the outcomes of the analysis of least significance difference (LSD) post hoc test showed that the active age category 60-70 had an identical difference in BMI than their sedentary age category 60-70 insignificantly, the active age category 71-80 has demonstrated a significant difference in BMI than their sedentary age category 71-80, and the active age category 81-90 had an identical difference in BMI than their sedentary age category 81-90 insignificantly.

Significant differences were found among three different age levels of male sedentary and active older adults of Punjab, India: 60-70, 71-80 and, 81-90 for their resting metabolism. It is evident from table 3. (b) that the results of the analysis of variance (ANOVA) amongst three different age levels of the male sedentary and active older adults; 60-70, 71-80 and, 81-90 on resting metabolism were found to be statistically significant (P>0.05). Since the obtained “F” ratio 2.444* (0.03) respectively was found statistically significant.

A glance at figure 3 (a) that the outcomes of the analysis of least significance difference (LSD) post hoc test showed that the active age category 60-70 had an identical difference in resting metabolism than their sedentary age category 60-70 insignificantly, the active age category
71-80 had an identical difference in resting metabolism than their sedentary age category 71-80 insignificantly, and the active age category 81-90 has demonstrated a significant difference in resting metabolism than their sedentary age category 81-90.

Table 2 (a). Mean and standard deviation results concerning body mass index among different three age levels in male sedentary and active older adults of Punjab, India

| Body Mass Index     | N  | Mean   | Std. Deviation | Std. Error |
|---------------------|----|--------|----------------|------------|
| Sedentary (60-70 age) | 30 | 27.81  | 6.27           | 1.14       |
| Active (60-70 age)  | 30 | 28.62  | 6.17           | 1.12       |
| Sedentary (71-80 age) | 30 | 26.32  | 5.57           | 1.01       |
| Active (71-80 age)  | 30 | 29.32  | 5.16           | 0.94       |
| Sedentary (81-90 age) | 30 | 26.25  | 4.92           | 0.89       |
| Active (81-90 age)  | 30 | 29.32  | 5.16           | 0.94       |
| Total               | 180| 27.25  | 5.44           | 0.40       |

Source: Search data.

Table 2 (a) revealed that the total number of subjects for the study was 180. The mean and standard deviation values of body mass index of male sedentary and active older adults of Punjab, India in 60-70 age, 71-80 age and 81-90 age were 27.81 ± 6.27, 28.62 ± 6.17, 26.32 ± 5.57, 29.32 ± 5.16, 26.25 ± 4.92 and 25.18 ± 3.19 respectively. The graphical representation of responses has been exhibited in figure 1.

Figure 1. Mean and Standard deviation results concerning body mass index among different three age levels in male sedentary and active older adults of Punjab, India.

Table 2 (b). Analysis of variance (ANOVA) results with concerning body mass index among different three age levels in male sedentary and active older adults of Punjab, India

| Source of variance | Sum of Squares | df  | Mean Square | F-ratio | Sig. |
|--------------------|----------------|-----|-------------|---------|------|
| Between Groups     | 378.733        | 5   | 75.747      | 2.677*  | 0.02 |
| Within Groups      | 4923.512       | 174 | 28.296      |         |      |
| Total              | 5302.246       | 179 |             |         |      |

* So result is significant at p<0.05 with df (5,174) =2.21

Source: Search data.
It is obvious from table 2 (b) that the outcomes of the analysis of variance (ANOVA) amongst 3 different age levels of male sedentary and active older adults of Punjab, India; 60-70 age, 71-80 age and, 81-90 age on body mass index were discovered to be statistically significant (P<0.05), F- value was 2.677*0.02 and was discovered statistically significant.

Table 2 (c). Analysis of least significant difference (LSD) post hoc test with regard to body mass index among different three age levels in male Sedentary and active older adults of Punjab, India

| Group (A)                  | Group (B)                  | Mean Difference (A-B) | Sig.   |
|---------------------------|---------------------------|-----------------------|--------|
| Sedentary (60-70 age)     | Active (60-70 age)        | -0.81                 | 0.55   |
| (Mean= -27.81)            | Sedentary (71-80 age)     | 1.48                  | 0.28   |
|                           | Active (71-80 age)        | -1.51                 | 0.27   |
|                           | Sedentary (81-90 age)     | 1.55                  | 0.25   |
|                           | Active (81-90 age)        | 2.62                  | 0.05   |
| Active (60-70 age)        | Sedentary (60-70 age)     | 0.81                  | 0.55   |
| (Mean= 28.62)             | Sedentary (71-80 age)     | 2.30                  | 0.09   |
|                           | Active (71-80 age)        | -0.70                 | 0.61   |
|                           | Sedentary (81-90 age)     | 2.37                  | 0.08   |
|                           | Active (81-90 age)        | 3.44*                 | 0.01   |
| Sedentary (71-80 age)     | Sedentary (60-70 age)     | -1.48                 | 0.28   |
| (Mean= 26.32)             | Active (60-70 age)        | -2.30                 | 0.09   |
|                           | Active (71-80 age)        | -3.00*                | 0.03   |
|                           | Sedentary (81-90 age)     | 0.07                  | 0.95   |
|                           | Active (81-90 age)        | 1.14                  | 0.40   |
| Active (71-80 age)        | Sedentary (60-70 age)     | 1.15                  | 0.27   |
| (Mean= 29.32)             | Active (60-70 age)        | 0.70                  | 0.61   |
|                           | Sedentary (71-80 age)     | 3.00*                 | 0.03   |
|                           | Sedentary (81-90 age)     | 3.07*                 | 0.02   |
|                           | Active (81-90 age)        | 4.14*                 | 0.00   |
| Sedentary (81-90 age)     | Sedentary (60-70 age)     | -1.55                 | 0.25   |
| (Mean= 26.25)             | Active (60-70 age)        | -2.37                 | 0.08   |
|                           | Sedentary (71-80 age)     | -0.07                 | 0.95   |
|                           | Active (71-80 age)        | -3.07*                | 0.02   |
|                           | Active (81-90 age)        | 1.06                  | 0.43   |
| Active (81-90 age)        | Sedentary (60-70 age)     | -2.62                 | 0.05   |
| (Mean= 25.28)             | Active (60-70 age)        | -3.44*                | 0.01   |
|                           | Sedentary (71-80 age)     | -1.14                 | 0.40   |
|                           | Active (71-80 age)        | -4.14*                | 0.00   |
|                           | Sedentary (81-90 age)     | -1.06                 | 0.43   |

*Significant at F 0.05*

Source: Search data.

Weighing up Table 2 (c) demonstrated that the mean value of body mass index of sedentary age category 60-70 was 27.81 whereas the active age category 60-70 had a mean value of 28.62 and the mean difference between both the groups was found -0.81. The p-value sig 0.55 shows that the active age category 60-70 had an identical difference in body mass index than their sedentary age category 60-70 insignificantly.

The mean value of sedentary age category 71-80 was 26.32 whereas the active age category 71-80 had a mean value of 29.32. The mean difference between these groups was found -3.00*. The p-value sig 0.03 showed that the active age category 71-80 has demonstrated a significant difference in body mass index than their sedentary age category 71-80.

The mean value of sedentary age category 81-90 was 26.25 whereas the active age category 81-90 had a mean value of 25.18 and the mean difference between both groups was found 1.06. The p-value sig 0.43 shows that the active age category 81-90 had an identical difference in body mass index than their sedentary age category 81-90 insignificantly.
Table 3 (a). Mean and standard deviation results concerning resting metabolism among different three age levels in male sedentary and active older adults of Punjab, India

| Resting Metabolism       | N  | Mean    | Std. Deviation | Std. Error |
|--------------------------|----|---------|----------------|------------|
| Sedentary (60-70 age)    | 30 | 1437.66 | 244.40         | 44.62      |
| Active (60-70 age)       | 30 | 1488.46 | 231.59         | 42.28      |
| Sedentary (71-80 age)    | 30 | 1459.43 | 248.47         | 45.36      |
| Active (71-80 age)       | 30 | 1497.03 | 201.00         | 36.69      |
| Sedentary (81-90 age)    | 30 | 1331.63 | 164.03         | 29.94      |
| Active (81-90 age)       | 30 | 1457.66 | 144.36         | 26.35      |
| Total                    | 180| 1445.31 | 213.65         | 15.92      |

Source: Search data.

Table 3 (a) revealed that the total number of subjects for the study was 180. The mean and standard deviation values of resting metabolism of a male sedentary and active older adults of Punjab, India in 60-70 age, 71-80 age and 81-90 age were 1437.66 ± 244.40, 1488.46 ± 231.59, 1459.43 ± 248.47, 1497.03 ± 201.00, 1457.66 ± 144.36 and 1331.63 ± 164.03 respectively. The graphical representation of responses has been exhibited in figure 2.

Figure 2. Mean and standard deviation results concerning resting metabolism among different three age levels in male sedentary and active older adults of Punjab, India

Source: Search data.

Table 3 (b). Analysis of variance (ANOVA) results concerning resting metabolism among different three age levels in male sedentary and active older adults of Punjab, India

| Source of variance | Sum of Squares | df  | Mean Square | F-ratio | Sig. |
|--------------------|----------------|-----|-------------|---------|------|
| Between Groups     | 536122.850     | 5   | 107224.570  | 2.444*  | 0.03 |
| Within Groups      | 7634594.100    | 174 | 43876.978   |         |      |
| Total              | 8170716.950    | 179 |             |         |      |

*So result is significant at p > 0.05 with df (5,174) =2.21

Source: Search data.

It is evident from table 3 (b) that the results of the analysis of variance (ANOVA) among three different age levels of a male sedentary and active older adults of Punjab India; 60-70 age, 71-80 age, and 81-90 age on resting metabolism were found to be statistically significant (P<0.05). F-value was 2.444*(0.03) and was found statistically significant.
The mean value of sedentary age category 60-70 was 1437.66 whereas the active age category 60-70 had a mean value of 1488.46 and the mean difference between both the groups was found at -50.800. The p-value sig 0.34 shows that the active age category 60-70 had an identical difference in resting metabolism than their sedentary age category 60-70 insignificantly.

The mean value of sedentary age category 71-80 was 1459.43 whereas the active age category 71-80 had a mean value of 1497.03. The mean difference between these groups was found at -37.60. The p-value sig 0.48 showed that the active age category 71-80 had an identical difference in resting metabolism than their sedentary age category 71-80 insignificantly.

The mean value of sedentary age category 81-90 was 1457.66 whereas the active age category 81-90 had a mean value of 1331.63 and the mean difference between both groups was found 126.03*. The p-value sig 0.02 shows that the active age category 81-90 has demonstrated a significant difference in resting metabolism than their sedentary age category 81-90.

**DISCUSSION**

This study investigated was to explore the assessment of body mass index and resting metabolism of older adults of Punjab, India. The results of the study confirmed that among three different age levels of male sedentary and active older adults of Punjab, India; 60-70, 71-80, and 81-90 on body mass index and resting metabolism were found to be statistically significant. Body mass index and resting metabolism as a person age according to this study significant difference is observed concerning for to different age categories. Body mass index resting metabolism changes with aging. These results of the study confirmed the findings of studies that have been revealed that fat mass higher and muscle mass reduce with aging. It has been suggested that reductions in RM with aging. It promotes changes in body composition (BC) approving higher fat mass and reduced fat-free mass (ST-ONGE, GALLAGHER, 2010).

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**Table 3 (c). Analysis of least significant difference (LSD) post hoc test with regard resting metabolism among different three age levels in male sedentary and active older adults of Punjab, India**

| Group (A) | Group (B) | Mean Difference (A-B) | Sig. |
|-----------|-----------|-----------------------|------|
| Sedentary (60-70 age) (Mean= 1437.66) | Active (60-70 age) | -50.80 | 0.34 |
| Sedentary (71-80 age) | Active (71-80 age) | 21.76 | 0.68 |
| Active (60-70 age) (Mean= 1459.43) | Sedentary (60-70 age) | 21.76 | 0.68 |
| Sedentary (71-80 age) | Active (71-80 age) | -29.03 | 0.59 |
| Active (71-80 age) | Sedentary (81-90 age) | -37.60 | 0.48 |
| Sedentary (81-90 age) (Mean= 1457.66) | Active (81-90 age) | 1.76 | 0.97 |
| Active (81-90 age) | Sedentary (60-70 age) | 127.80 | 0.00 |
| Sedentary (60-70 age) (Mean=1497.03) | Active (60-70 age) | 59.36 | 0.27 |
| Sedentary (71-80 age) | Active (60-70 age) | 8.56 | 0.87 |
| Active (60-70 age) | Sedentary (71-80 age) | 37.60 | 0.48 |
| Sedentary (71-80 age) | Active (81-90 age) | 39.36 | 0.46 |
| Active (81-90 age) (Mean= 1331.63) | Sedentary (60-70 age) | 20.00 | 0.71 |
| Active (60-70 age) | Sedentary (71-80 age) | -1.76 | 0.97 |
| Active (71-80 age) | Sedentary (81-90 age) | -39.36 | 0.46 |
| Active (81-90 age) | Active (81-90 age) | 126.03* | 0.02 |
| Sedentary (60-70 age) | Sedentary (60-70 age) | -59.36 | 0.27 |
| Sedentary (71-80 age) | Active (60-70 age) | 29.03 | 0.59 |
| Active (60-70 age) | Sedentary (81-90 age) | -37.60 | 0.48 |
| Sedentary (81-90 age) | Active (81-90 age) | 1.76 | 0.97 |
| Active (81-90 age) | Sedentary (60-70 age) | 127.80* | 0.00 |

*Significant at F 0.05*

**Source:** Search data.
A large body of literature indicates that attaining suggested levels of moderate-to-vigorous physical activity (MVPA) is negatively related to indications of overweight and obesity (e.g., BMI) in older adults (KUHLE et al., 2014). (FERNANDA, et al., 2019) the relationship among sedentary or active time, light physical activity (LPA), and moderate to vigorous physical ability (MVPA) with the senior citizens physical ability. LPA time was negatively connected with body mass index (BMI). In the active set, MVPA time was connected with a lesser body mass index (BMI). BMI (body mass index) groups, individuals who were physically active senior citizens were reduced likely to have an irregular physical function (PF) scores evaluated to those who were sedentary senior citizens.

Aging was related to lesser levels of physical activity or exercise and physical function (PF), physical activity is related to significantly lower odds of physical and functional limitations in obese elderly. Factors of body composition (BC) were resulting in together groups by OMRON Karada Scan which were associated for statistical significance. Body mass index (BMI) is associated positive relation in all sets (SOLANKI et al, 2015).

Body mass index (BMI) was assessed by using a Body Composition Monitor at three (3) points of time. Body mass index (BMI) next 1 month in the study cohort, which was statistically significantly associated with the control group (CG) (P < 0.0001) (SANDEEP et al. 2016). The body mass index was a significant difference element for overall Physical activity both in males and females as well as for moderate physical activity (MPA) for women (KLEINKE et al., 2021).

Body mass index, skeletal muscle mass, body fats were assessed by investigation using the OMRON body composition monitor (BCM) with rulers. A result showed that BMI or body mass index, BF, or body fat was greater. When the investigation was completed founded on sex, there were significant differences (SUDARMA, HALIM, 2017). For older adults, there is a curvilinear increase or rise in excess mortality (a greater number of deaths than expected in a given population with an increasing BMI (BRAY, 1985). Significant increases in risk being at a BMI or body mass index of 27.3 for females and 27.8 for males. Therefore, in 1987, the National Center for Health Statistics defined obesity as a BMI of 27.3 for females and 27.8 for males a little elevated risk of developing health issues (LOHMAN, 1994).

Older populations with greater BMI body mass index had lesser total energy expenditure (TEE) and lesser intensity and smaller PA duration than senior citizens population with lesser Body mass index (WLODAREK et al., 2012). (YU, et al., 2018) investigated to recognize the overweight rate and obesity rate in middle-aged and senior citizens people in the urban area of Beijing and investigate the variations of resting metabolic rate (RMR) with age. Resting metabolism in different age groups was different. From various studies, it is well known that resting metabolism (RM) declines with advancing age (KEYS et al., 1973; ROBINSON et al., 1975; TZANKOFF, NORRIS, 1978).

Aging is also related to a reduction in fat-free mass (FFM), which is the main factor of resting metabolism (REED et al., 1991; BAUMGARTNER et al., 1995; SUOMINEN, 1997). Resting metabolism per kilogram body mass reduces with increasing age independently of physical activity or exercise. Regular physical training or activity in senior citizens male seems to avoid the changes in (BC) body composition (HORBER et al., 1996). An occasional study has even shown a decrease in resting metabolism when exercise training was added to serve caloric restriction (POEHLMAN, 1989).

CONCLUSION
In conclusion, the BMI and RM changes with aging. The study has revealed that for persons taking part in moderate or vigorous physical activities their body mass increases and RM reduces with aging. The active older adults exercise and taking part in physical activity have multiple implications to overweight /obesity and have enough energy stores to perform the activity. The results strongly confirm significant differences were observed among three different age categories of male sedentary and active older adults of Punjab India: 60-70, 71-80, and 81-90 for their BMI and RM. The active age category 60-70 have shown an identical difference in BMI and RM than their sedentary age category 60-70, the active age category 71-80 significant difference in BMI and the identical difference in RM than their sedentary age
category 71-80, the active age category 81-90 had an identical difference in BMI and significant difference in RM than their sedentary age category 81-90.

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Assessment of body mass index and resting metabolism of male sedentary and active older adults of Punjab, India

Avaliação do índice de massa corporal e do metabolismo de repouso de homens sedentários e adultos idosos ativos de Punjab, Índia

Evaluación del índice de masa corporal y el metabolismo en reposo de adultos mayores sedentarios y activos masculinos de Punjab, India

Resumo
Este estudo teve como objetivo investigar a avaliação do índice de massa corporal e do metabolismo de repouso de homens idosos sedentários e ativos de Punjab, Índia. Métodos: Participantes (N = 180) do grupo sedentário (N = 90) e do grupo ativo (N = 90) idosos de Punjab foram selecionados para atuar como sujeitos do estudo. O estudo foi delimitado aos idosos sedentários e ativos do sexo masculino, recrutados na faixa etária de 60 a 70, 71 a 80 e 81 a 90 anos, respectivamente. Resultados: Os resultados dos estudos em ambas as variáveis encontraram que houve diferença estatisticamente significativa em ambas as variáveis com valor p do índice de massa corporal 0,02 (P <0,05) e valor p do metabolismo de repouso foi 0,03 (P <0,05) de adultos idosos ativos e sedentários do sexo masculino. Conclusão: Em conclusão, o estudo revelou que, para pessoas que praticam atividades físicas moderadas ou vigorosas, o índice de massa corporal e o metabolismo de repouso mudam com o envelhecimento.

Palavras-chave: Índice de massa corporal. Metabolismo de repouso. Monitor de composição corporal. Sedentários. Ativos e idosos.

Abstract
This study aimed to investigate the evaluation of body mass index and resting metabolism of sedentary and active elderly men from Punjab, India. Methods: Participants (N = 180) of the sedentary group (N = 90) and active group (N = 90) elderly people from Punjab were selected to act as study subjects. The study was delimited to sedentary and active male elderly, recruited between 60 and 70, 71 to 80 and 81 to 90 years, respectively. Results: The results of the studies in both variables found that there was a statistically significant difference in both variables with p-value of body mass index 0.02 (P <0.05) and p value of resting metabolism was 0.03 (P <0.05) of active and sedentary male elderly adults. Conclusion: In conclusion, the study revealed that, for people who practice moderate or vigorous physical activities, body mass index and resting metabolism change with aging.

Keywords: Body mass index. Resting metabolism. Body composition monitor. Sedentary. Active and older adults.

Resumen
Este estudio tuvo como objetivo investigar la evaluación del índice de masa corporal y el metabolismo en reposo de hombres ancianos sedentarios y activos de Punjab, India. Métodos: Los participantes (N = 180) del grupo sedentario (N = 90) y del grupo activo (N = 90) ancianos de Punjab fueron seleccionados para actuar como sujetos de estudio. El estudio se delimitó a ancianos varones sedentarios y activos, reclutados entre 60 y 70, 71 a 80 y 81 a 90 años, respectivamente. Resultados: Los resultados de los estudios en ambas variables encontraron que hubo una diferencia estadísticamente significativa en ambas variables con p-valor del índice de masa corporal 0.02 (P <0.05) y p valor del metabolismo en reposo fue de 0.03 (P <0.05) de adultos mayores varones activos y sedentarios. Conclusión: En conclusión, el estudio reveló que, para las personas que practican actividades físicas moderadas o vigorosas, el índice de masa corporal y el metabolismo en reposo cambian con el envejecimiento.

Palabras-clave: Índice de masa corporal. Metabolismo en reposo. Monitor de composición corporal. Sedentarios. Activos y adultos mayores.