

# Correlation of Body Mass Index with Physical Activity and Health Related Quality of Life in Geriatric Population

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## ABSTRACT

**Background:** Geriatrics is defined as a branch of medicine which deals with the disease, disabilities & care of aged person. Inactivity may lead to overweight and obese in elderly people. With the increasing ageing population and the extension of life expectancy, improving health-related quality of life of older adults is an important public health issue. Health related quality of life is a predictive factor of mortality in older adults.

**Purpose:** The purpose of this study to find the correlation of Body Mass Index with Physical Activity and Health related quality of life in Geriatric population.

**Methodology:** An observational study was conducted by convenience sampling on Geriatric population. The height and weight of participants was measured by measure tape and weighing scale. International Physical Activity Questionnaire for Elderly was used for physical activity, and Older People's Quality of Life Questionnaire was used for Health-Related Quality of Life of geriatric population. Printed version of questionnaire was given to all elderly participants in the convenient language.

**Result:** Mean Age of Geriatric population is  $70.04 \pm 6.11$  years. Parametric test was applied to find the correlation between body mass index and Quality of Life. And non-parametric were used to find the correlation between body mass index and physical activity.

**Conclusion:** As the body mass index increases, physical activity in geriatric population

decreases. As the physical activity increases, quality of life in geriatric population increases.

**Keywords:** Geriatric population, physical activity, quality of life, body mass index.

## INTRODUCTION

Geriatrics is defined as a branch of medicine which deals with the disease, disabilities & care of aged person. An elderly is defined as 65 years of age or above<sup>1</sup>. Elderly is defined as being 65 years or age or older<sup>1</sup>. Elderly or old age consists of ages nearing or surpassing the average life span of human beings. According to World Health Organization 'The ageing process is of course a biological reality which has its own dynamic largely beyond human control.'<sup>2</sup>

Body Mass Index (BMI) is a frequently used standard to estimate underweight, normal weight, overweight and obesity. It is determined by dividing body weight in kilograms by squared of the body height in meters. Formula is universally accepted in medicine for BMI.<sup>3</sup> Increases in the Body Mass Index (BMI) in the elderly people might reduce life expectancy and increase the risk of mortality, cardiovascular disease, and metabolic syndrome.

Physical activity is defined as any bodily movement produced by skeletal muscle that result in energy expenditure. WHO published guidelines on the importance of

physical activity in the elderly. According to these guidelines, exercise is an effective way of preventing the decline of older people's functional capacity. Physical activity can help in preventing and managing certain chronic disease and condition in elder people.<sup>4</sup>

Physical frailty is considered to be reversible and preventable.<sup>5</sup> Physical activity (PA) is a key factor of reverse and prevent frailty in older adults.<sup>6</sup> PA can alleviate the decline of physical function in older adults and has a beneficial effect on functional limitations, physical frailty, disability and quality of life in older adults.<sup>7</sup> Performing a PA of moderate to vigorous intensity would improve physical frailty and prevent the occurrence of disability when compared with the performance of a PA of low intensity, ultimately promote older adults' quality of life.<sup>8</sup>

World Health Organization [WHO] has defined Quality of Life as people's perception of opportunities, expectations, standards, and concerns in life. Quality of Life has different physical, mental, and social aspects. Although ageing and increased life expectancy in community seems desirable, mental, physical and physiological changes that occur commonly in elderly can reduce quality of life.<sup>9</sup>

According to the World Health Organization, the HRQOL is defined as "the quality of life directly associated with health of an individual including physical, mental and social well-being." As the concept of health is gradually transforming from a relief from past diseases to a concept emphasizing on an individual's ability to perform daily activities, there is a growing interest in the association between various diseases and the quality of life.<sup>10</sup>

The aim of this study to correlate the Body Mass Index with physical activity and health related quality of life in Geriatric population. The objective of this study is to find the correlation between Body Mass Index & Physical Activity in Geriatric population, to find the correlation between Body Mass Index and Health Related of

Quality of Life in Geriatric population, to find the correlation between Physical Activity and Health Related of Quality of Life in Geriatric population.

## **LITERATURE REVIEW**

**Masoume Rambod, et al. 2019** did a cross sectional study to find out the association between body mass index and comorbidity, quality of life and cognitive function in Elderly population. The participants included 246 old people who referred to Imma Reza elderly clinic, Shiraz, Iran. The data were collected using Leipad Quality of life Questionnaire and Mini Mental State Examination [MMSE]. Indeed, weight and height were measured to assess the BMI. The study showed that 104 participants were overweight and obese and 93 had cognitive impairments. The results showed a significant difference among normal weight, overweight and obese group regarding the mean score QOL ( $p=0.001$ ) and cognitive function ( $p=0.001$ ). The association BMI and QOL ( $r=-0.52$ ,  $p<0.001$ ) and cognitive function ( $r=-0.28$ ,  $p<0.001$ ) were significant. They concluded that overweight and obesity participants had lower quality of life compared to normal weight subjects. And overweight and obese elderly subjects had lower mean score of cognitive function.<sup>11</sup> **Pablo Jorge Marcos-Pardo, et al 2019**, did a study to investigate the effects of 12 weeks of moderate-to-high intensity resistance circuit training (MHRCT) on body composition (BC), functional autonomy (FA), muscular strength (MS) and quality of life (QOL) on healthy elderly people. A total of 75 subjects were recruited from an elderly social group from Murcia (intentionally selected) and voluntarily participated in the study. Participants who meet the inclusion criteria were electronically randomized by blocked-design into two arms: a control group (CG), and an experimental group (EG). The results shown that Intra-group comparison, the experimental group showed a significant increment of lean body mass in women and men, which also presented a

decrease of fat mass. They have concluded the moderate-to-high intensity resistance circuit training showed increase in total lean body mass, improvements in functional capacity and significantly increase in upper and lower muscular strength in women and men. Progressive resistance circuit training should be promoted for the elderly as it has the potential to improve physical performance, thereby prolonging healthy independent aging.<sup>12</sup> **Hua You, Xiao-lu Li, et al 2018**, conducted a study to explore the effects of (body mass index) BMI on Health-Related Quality of Life (HRQOL) among the elderly in Jiangsu, China. 10,257 community dwelling elderly ( $\geq 60$  years old) were enrolled in a cross-sectional study. HRQOL was measured via the Eq-5d-3 L. Chi-square tests and one-way ANOVA analyses were used to compare the frequencies and scores of Eq-5d responses among different BMI groups. Logistic regression analyses were conducted to examine the associations between BMI and HRQOL. The results shown that responses frequency and scores of Eq-5d-3 L, there were significant differences among BMI groups ( $P < 0.001$ ). They concluded that underweight is an explicit risk factor of low HRQOL in both the male and female elderly, while the effect of overweight on low HRQOL varies slightly by gender.<sup>13</sup> **Walid Kamal Abdelbasset, et al 2018** did a cross-sectional study to evaluate the association between physical activity level and health-related quality of life in community-dwelling middle aged and older adults in Egypt. 184 middle-aged and older adults between the ages of 55 and 64 years old (129 males and 55 females) participated in this study. The health-related quality of life (HRQOL) was calculated using the Euro-Quality of life-5dimensions-3 levels scale questionnaire (EuroQol-5D-3L). Spearman's correlation coefficient was performed to determine the correlation between the physical activity level and HRQOL scores in community-dwelling middle-aged and older adults. The results showed a significant correlation ( $r=0.67$ )

between the physical activity levels and HRQOL dimensions. Significant differences were observed in the HRQOL scores between high, moderate and low-physical activity groups ( $p < 0.05$ ). The moderate and high-physical activity groups had significantly higher HRQOL scores in all dimensions than low-physical activity group. They have concluded that high and moderate levels of physical activity have a great positive relationship with the HRQOL in community-dwelling middle-aged and older adults in Egypt.<sup>14</sup>

## **MATERIALS & METHODS**

Observational study was conducted by convenience sampling from communities of Ahmedabad city. The estimated sample size was 80 subjects. Total duration of the study was 1 year. 65 years old and above both male & female were included in the study. Any neurological condition [example: parkinsonism, Stroke, ataxia, etc.], recent traumatic injuries [example: Fracture, any back, shoulder, knee injuries  $\leq 3$  month], any psychiatric illness were excluded. Subject were asked to fill the proforma. The height and weight of participants was measured by measure tape and weighing scale. International Physical Activity Questionnaire for Elderly (IPAQ-E) was used for physical activity, and Older People's Quality of Life Questionnaire (OPQOL-35) was used for Health-Related Quality of Life of geriatric population. Printed version of questionnaire was given to all elderly participants in the convenient language and asked to fill this questionnaire.

## **STATISTICAL ANALYSIS**

Data was analyzed using IBM SPSS version 16 & Microsoft Excel 2019. Level of significance was kept at 5% using parametric and non-parametric correlation test.

## **RESULT**

The present study was conducted to find the correlation between body mass index with physical activity and health related quality

of life in geriatric population. 80 male and female geriatric subjects with age above 65 years from community were included for the study. Physical activity was assessed by International Physical Activity Questionnaire for Elderly and Quality of Life was assessed by Older People Quality of Life questionnaire. The distribution of each variable was examined using the Kolmogorov–Smirnov normality test, because sample is greater than 50. BMI and Quality of life data follow normal distribution so parametric tests were used to Analyze the data. And physical activity data

did not follow normal distribution so nonparametric tests were used to analyze the data.

Correlation was found between BMI and Quality of Life using Pearson correlation. Where physical activity variable was not normally distributed, so correlation was found between BMI and Physical activity using spearman’s correlation coefficient.

	Male (Age)	Female (Age)	Mean ± SD (Years)
Total	44	36	70.04 ± 6.11

Outcome measures	Mean ± SD	Median
BMI	24.63 ± 4.27	24.26
IPAQ-E	1399.34 ± 1260.61	887.75
OPQOL	127.49 ± 9.36	128

Correlation between physical activity with body mass index and quality of life was done using Spearman’s correlation test, because data did not follow normal distribution.

There was a very weak negative correlation found between body mass index and

physical activity at  $r = -0.139$  which was statistically not significant at  $p = 0.218$ . There was a moderate positive correlation found between physical activity and health related quality of life at  $r = 0.310$  which was statistically significant at  $p = 0.005$ .

Outcome measures	NORMAL	UNDER WEIGHT	OVER WEIGHT	OBESE
BMI	21.31 ± 1.24	17.88 ± 0.64	24.81 ± 1.44	30.27 ± 1.72
IPAQ-E	1560.58 ± 1361.74	1995.3 ± 1696.8	1156.40 ± 1001.85	1356.64 ± 1293.47
OPQOL	127.16 ± 12.92	122.22 ± 9.05	127.77 ± 7.39	129.62 ± 7.49

This shows that geriatric population in normal BMI are having moderate level of physical activity than the overweight and obese geriatrics.

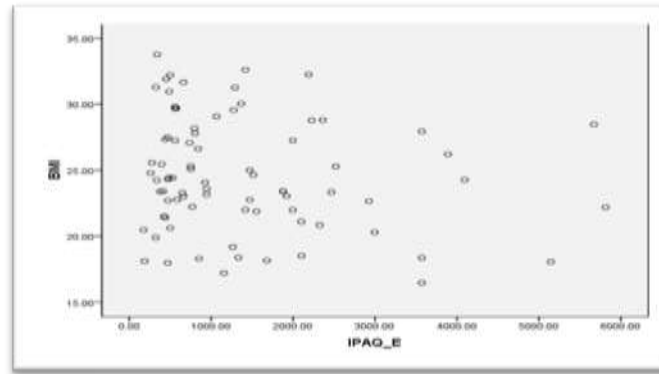
Spearman’s correlation	$r_s$ - value	p- value
BMI & IPAQ-E	-0.139	0.218
IPAQ-E & OPQOL	0.310	0.005

Correlation between body mass index and quality of life was done using Pearson

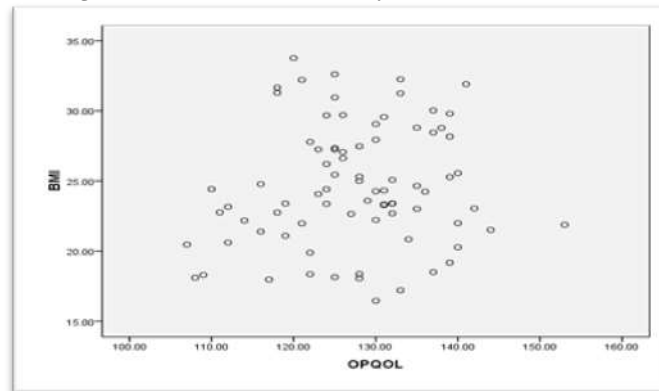
correlation test, because data follow normal distribution. There was a very weak positive correlation found between body mass index and health related quality of life at  $r = 0.123$  which was statistically not significant at  $p = 0.278$ .

Pearson correlation	r- value	p- value
BMI & OPQOL	0.123	0.278

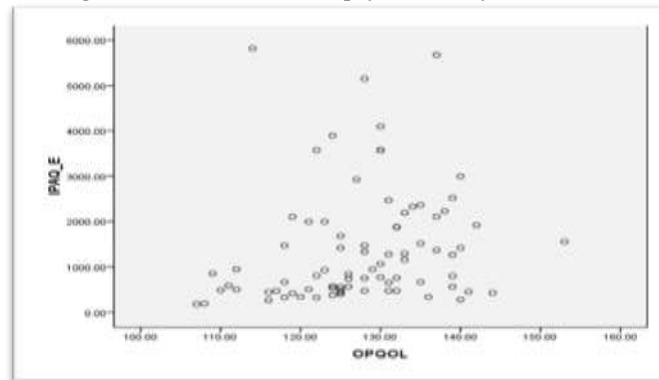
Graph-1: Scatter diagram of correlation between body mass index and physical activity.



Graph-2: Scatter diagram of correlation between body mass index and health related quality of life.



Graph-3: Scatter diagram of correlation between physical activity and health related quality of life.



## DISCUSSION

The present study was conducted on 80 geriatric subjects to find the correlation of body mass index with physical activity and health related quality of life, with age of 65 years and above from community in Ahmedabad. Among them 9 participants had normal body mass index, 19 were underweight, 31 were over-weight and 21 were obese. Mean value of BMI was  $24.63 \pm 4.27$ , IPAQ-E was  $1399.34 \pm 1260.61$  and OPQOL was  $127.49 \pm 9.26$ . There was a very weak negative correlation was found

between body mass index and physical activity, which was statistically not significant ( $r = -0.139$ ,  $p = 0.218$ ). In the present study, the correlation between physical activity and health related quality of life which showed moderate positive correlation, which was statistically significant ( $r = 0.313$ ,  $p = 0.005$ ). The correlation between body mass index and health related quality of life which showed very weak positive correlation, which was statistically not significant ( $r = 0.123$ ,  $p = 0.278$ ).



**Lucineide da Silva Santos Castelo Branco de Oliveira et al (2019)<sup>15</sup>** This study found that physically active elderly individuals had significantly higher overall QOL scores than their sedentary counterparts, who had the lowest results and a statistically significant relationship with anxiety and depression. In this study, the highest scores obtained by the physically active older adults indicated a better QOL. They suggested that regular physical activity can contribute to improved QOL. And they revealed that active seniors have better QOL and it reduce risk of obesity and overweight. This study support to the present study's results that there was a moderate positive correlation between physical activity and health related quality of life in geriatric population.

In the present study mean IPAQ-E was  $1399.34 \pm 1260.61$  MET. In Normal BMI mean IPAQ-E score was  $1560.58 \pm 1361.74$  MET, Underweight group mean IPAQ-E score was  $1995.3 \pm 1696.8$  MET, Overweight group mean IPAQ-E score was  $1156.40 \pm 1001.85$  MET. Obese group mean IPAQ-E score was  $1356.64 \pm 1293.47$  MET. This shows that geriatric population in normal BMI are having moderate level of physical activity than the overweight and obese geriatrics. Physical activity also correlated with age criteria.

**Lekshmi Prasad, Jean Fredrick et al (2021)<sup>16</sup>**, This was a cross-sectional analytical study. 89 community dwelling older adults between 60 and 80 years of age were recruited. There was also a positive correlation between physical activity level and different domains of QOL except for social relationship. This study is similar to the present study, the correlation between physical activity and health related quality of life which showed moderate positive correlation, which was statistically significant.

**P. Serrano-Aguilar et al (2008)<sup>17</sup>**, he reported that in older adult excessive weight has a negative impact on HRQOL, even for people without chronic disease. In the present study results shows very weak

positive correlation between body mass index and health related quality of life in geriatric population. In this study age of geriatric was not distributed equally in all BMI category. In the Present study, moderate level of physical activity was done by geriatric population, so that the quality of life is good in present study, so the body mass index was not directly related to quality of life.

**Gyeongsil Lee, Jiyoung Park et al<sup>18</sup>**, found that There was no significant association between a high BMI and a low quality of life in the elderly Korean population selected from hospitals and welfare centers, as assessed using the SF-36 scores, which is similar to the present study. correlation between BMI and OPQOL the result shows very weak positive correlation between body mass index and health related quality of life, which was statistically not significant in present study. So high BMI subjects having good quality of life because of moderate level of physical activity.

**Chares A. German MD et al (2020)<sup>19</sup>**, Physical Activity variables were modestly correlated with measures of exercise capacity and were not significantly correlated with QOL. In the present study, the correlation between IPAQ-E and OPQOL using spearman's correlation coefficient test. The result shows moderate positive correlation between physical activity and health related quality of life, which was statistically significant ( $r= 0.313$ ,  $p= 0.005$ ).

**Lijing L. Yan, Martha L et al<sup>20</sup>**, included people from mixed age groups. They conclude that obesity was associated with lower health perception and poorer physical and social functioning (women only) but not impaired mental health. Overweight was associated with impaired physical well-being among women only. Both underweight men and women reported impairment in physical, social, and mental well-being. Compared with normal-weight people, both underweight and obese older adults reported impaired quality of life, particularly worse physical functioning and

physical well-being. These results reinforce the importance of normal body weight in older age.

## CONCLUSION

There is very weak negative correlation found between body mass index and physical activity. ( $r = -0.139$ ,  $p = 0.218$ ). As the body mass index increases, physical activity in geriatric population decreases. Hence there is correlation between body mass index and physical activity. So overweight and obese had low level of physical activity.

There was a weak positive correlation found between physical activity and health related quality of life ( $r = 0.310$ ,  $p = 0.005$ ). As the physical activity increases, quality of life in geriatric population increases. There was a very weak positive correlation found between body mass index and health related quality of life ( $r = 0.123$ ,  $p = 0.278$ ).

## Declaration by Authors

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**Conflict of Interest:** The authors declare no conflict of interest.

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