# An Examination of the Severity of Periodontal Disease in Elderly Men with Varying Degrees of Physical Activity

**Smitha Shetty[1], Smeet Gusani[2], Mranali K Shetty[3]**

*[1]Reader, Department of Periodontics, A B Shetty Memorial Institute of Dental Sciences, Nitte Deemed to be University. [2]Private Practitioner, [3]Associate Professor, Department of Periodontology, Manipal College of Dental Sciences, Mangalore, Manipal Academy of Higher Education,Manipal, Karnataka, India*

## Abstract

**Abstract Objectives:** Regular physical activity has been shown to protect against chronic diseases in studies. The majority of studies have only looked at this association in children and teenagers. The goal of our study was to see how regular physical activity affected elderly males.

**Methods:** The study comprised 90 male patients aged 50 to 69 who visited the A. B. Shetty Memorial Institute of Dental Sciences' outpatient department.

**Results:** The prevalence of localized periodontitis was highest among the medium physical activity group and prevalence of generalized periodontits was highest among low physical activity group.

**Conclusions:** Our findings reveal that regardless of the patients' levels of physical activity, they all developed periodontitis, which was linked to their brushing habits.

***Keywords-*** *Periodontitis, Physical activity, elderly males.*

## Introduction

The prevalence of mild to moderate periodontitis was found to be highest among the elderly, while severe periodontal disease was found to be uncommon. Because the majority of older patients are edentulous, extraction is usually the preferred treatment for severe periodontal and periapical infections in the dentate elderly. Older people prefer to keep their original teeth, and periodontal disease is projected to rise as a result of the increased number of natural teeth retained into old age. [1]

Periodontitis is a widespread chronic disease all over the world, and it has lately been linked to a higher risk of systemic diseases.

The Periodontitis is caused by a combination of environmental and systemic variables such as smoking, stress, and diabetes. [2,3] More research into techniques to decrease the progression of disease is needed. [4] Limiting the pro-inflammatory component of pathogenesis by measures that do not rely on a pharmaceutical or a therapeutic intervention is of great public health importance. Physical activity on a regular basis may provide a straightforward

**Corresponding Author:**
**Dr Mranali K Shetty**
Associate Professor, Department of Periodontology,Manipal College of Dental Sciences, Mangalore, Manipal Academy of Higher Education, Manipal, Karnataka, India-576104.

behavioural technique for reducing inflammation. Physical activity, in addition to its other benefits, appears to have an anti-inflammatory effect, according to growing data. A lifestyle adjustment like this could help those with periodontitis, an inflammatory illness.[5]

Regular physical activity promotes overall health and quality of life. [6] Regular physical exercise is inversely associated to the risk of various noncommunicable chronic illnesses. Premature death is also a result of inactivity. [7] Physically active people may have a lower risk of periodontitis, according to new research. [2,5] Obese people had a positive relationship with periodontitis, indicating that fitness plays a role in overall dental health. [8,9] Physical activity promotes health and quality of life in general. [6] Regular physical exercise is inversely associated to the risk of various noncommunicable chronic illnesses. Premature death is also a result of inactivity. [7] Physically active people may have a lower risk of periodontitis, according to new research. [2,5] A positive correlation was seen in obese individuals in regard to periodontitis, further confirming a role of fitness in relation to general health of the oral cavity.[8,9]

It is well known that men are more hesitant than women to seek medical help, whether it is through refusing to see a doctor or failing to report signs of illness or disease on a regular basis. As it comes to sex differences in periodontal disease, the overwhelming evidence reveals that it is men's behaviour, not biological deficiencies, that puts them at higher risk for more severe forms of periodontal disease when compared to women. [10]

Despite the fact that regular physical activity has been shown to reduce the risk of a range of chronic diseases, there is little study on the link between physical activity and periodontitis in the elderly. Male-specificity was chosen because to the differences in physiological changes, metabolic chemistry, and bacterial flora between the sexes. [11] As a result, this research was conducted. The researchers wanted to discover if there was a link between physical activity and geriatric periodontal health. Positive findings from this study may provide an additional motivation factor for our elderly to stay in shape and maintain a healthy habit. As a result, this study was carried out with the purpose of determining whether there was a link between physical activity and periodontal health in the elderly. Positive findings from this study may serve as an additional motivator for our elderly to stay in shape and incorporate regular exercise into their daily routine.

## Aims & Objectives:

**Objective:**

1. To determine the severity of periodontal disease in people aged 50 to 69 who have little physical activity.

2. To assess the severity of periodontal disease in people between the ages of 50 and 69 who engage in moderate physical activity.

3. To assess the severity of periodontal disease in people aged 50 to 69 who engage in a lot of physical activity.

4. To compare the severity of periodontal disease in the various groups stated above.

## Materials & Methods

A total of 90 males between the ages of 50 and 69 who reported to the A. B. Shetty Memorial Institute of Dental Sciences' outpatient department were chosen and divided into three groups of 30 based on the IPAQ QUESTIONAIRE as follows:

§ ***Group 1***: 30 Individuals with low physical activity

§ ***Group 2***: 30 Individuals with moderate physical activity

§ ***Group 3***: 30 Individuals with high physical activity

**Inclusion criteria:**

***1.*** Male Subjects aged between 50-69 years ofage

***2.*** Male Subjects with at least 20 permanent teeth.

**Exclusion criteria**

***1.*** Subjects with systemic diseases and conditions that impact periodontal conditions.

***2.*** Subjects who have undergone periodontal treatment in the last 6 months.

***3.*** Subjects on any medication, mouthwashes and supplements within the last 3 months.

*An oral examination will be conducted wherein the following examinations were done: (Proforma is enclosed)

- o Gingival Index(Loe & Sillness)
- o Pocket depth measurement
- o Clinical Attachment Loss

**Physical Activity**

Level of physical activity was assessed using the short form of the International Physical Activity Questionnaire (IPAQ). The questionnaire consists of seven questions for the evaluation of the time spent carrying out various physical activities of different grades.

The IPAQ classifies subjects into three categories (*Low, Moderate,* and

*High* physical activity) based on a scoring protocol.[12]

➢ **Category 1**

***Low***

This is the lowest level of physical activity. Those individuals who do not meet criteria for Categories 2 or 3 are considered to have a „*Low*" physical activity level.

➢ **Category 2**

**Moderate**

The pattern of activity to be classified as „moderate" is either of the following criteria:

***a)*** Intense activity for twenty minutes per day for up to 3 or more days

OR

***b)*** Adequate-intense activity / walking for minimum 30 minutes per day for 5 or more days

OR

***c)*** 5 days or more of any combination of walking, moderate-intensity

or high-intensity activities resulting in at least 600 MET-minutes of total physical activity per

* Those who meet at least one of the following requirements are considered to have accumulated a minimal level of activity and are thus classified as "Moderate."

3rd category

High

To describe higher degrees of participation, a new category called "High" can be introduced. The following are the two criteria for being classified as "High":

a) 3 days of high-intensity activity with a total physical activity of at least 1500 MET-minutes each week OR

b) for 7 days or more, a combination of walking, moderate-intensity, or vigorous-intensity activities, attaining a minimum Total physical activity activity of at least 3000 MET-minutes/week.

**Clinical examination**

The participants of the study were subjected to periodontal exaination. Sterile mouth mirrors and Williams periodontal probes were used to assess the Gingival status, measure Probing Pocket Depth (*PPD*) and Clinical Attachment Loss (*CAL*). Each participant was assessed using the *Gingival Index* of Loe & Silness,[13] where six index teeth were used for the assessment of the level of gingivitis that prevailed.

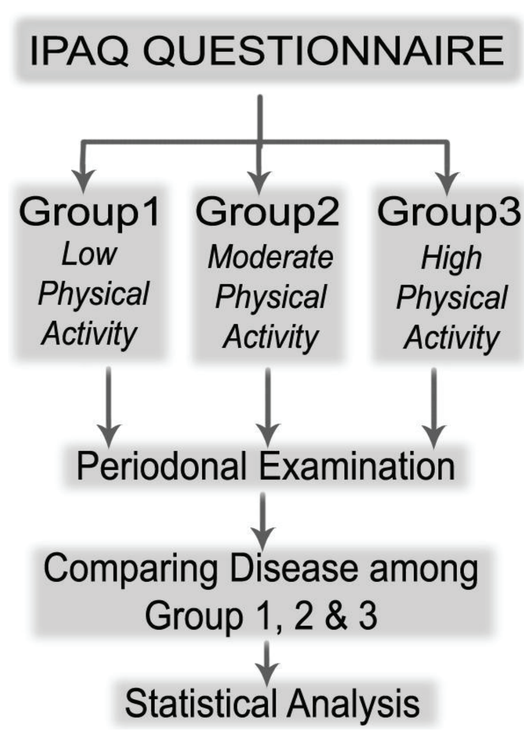
Periodontal statuses of all teeth were determined by calculating the Clinical Attachment Loss (CAL) Probing Pocket Depth (PPD) . PPD and CAL were determined at 6 sites (mesio-buccal, mid- buccal, disto- buccal, and mesio-lingual, mid-lingual and disto-lingual) for each tooth for all teeth present. PPD $\geq$ 4mm and CAL $\geq$ 3mm will be considered as periodontitis.

***Classification of extent of periodontal disease by AAP 1999-***

***sites involved -- <30%:- Localized***

***>30% :-Generalized***

The mean Gingival Index, PPD and CAL over all the examined sites were calculated for each participant.




*Study*

*Design*

## Statistical Analysis

The values obtained were tabulated and statistical analysis was done. Mean and Standard Deviation were determined for each of the PPD, CAL, Gingival index

Pearson‟s Chi Square test was done to calculate the relation between severity of periodontal disease and the different levels of physical activity.

## Results

The prevalence of localized periodontitis was highest among the medium physical activity group and prevalence of generalized periodontitis was highest among low physical activity group.

**Descriptive Statistics**

**Table 1 shows the mean Gingival Index Periodontal**

| IPAQ | | Mean | Std. Deviation | N |
|---|---|---|---|---|
| Low | Gingival index | 1.3900 | .23245 | 30 |
| | Total_mean_PPD | .2047 | .38371 | 30 |
| | Total_mean_CAL | .6413 | .18519 | 30 |
| Moderate | Gingival index | 1.3067 | .22581 | 30 |
| | Total_mean_PPD | .2633 | .45378 | 30 |
| | Total_mean_CAL | .6113 | .16596 | 30 |
| High | Gingival index | 1.3267 | .26514 | 30 |
| | Total_mean_PPD | .4293 | .48230 | 30 |
| | Total_mean_CAL | .6800 | .19678 | 30 |

Pocket Depth (PPD), and the Clinical Attachment Loss (CAL), with relation to the 3 grades of Physical activity in accordance with IPAQ Questionnaire.

**Table 2 shows the percentage of individuals with localized periodontitis and generalized periodontitis under different categories of physical activities classified according to IPAQ**

| IPAQ | Total | Severity of Periodontitis | |
|---|---|---|---|
| | | Localized | Generalized |
| Low | 30 | 23( 76.7% ) | 7(23.3%) |
| Medium | 30 | 27(90%) | 3(10%) |
| High | 30 | 24(80%) | 6(20%) |
| Total | 90 | 74(82.3%) | 16(17.7%) |

**Table 3 to ascertain whether a difference was present in the severity of periodontal disease between the three groups of physical activity (i.e., High, moderat***e and low***), a Pearson chi-square test was conducted.**

| | Value | df | Asymp. Sig. (2-sided) | Exact Sig (2- sided) |
|---|---|---|---|---|
| Pearson Chi- Square | 1.976a | 2 | 0.372 | 0.474 |

**a.** 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.33

## Discussion

Periodontal health may be influenced by the physical activity.Physical activity may be one of the mechanism which protects against the periodontitis by increasing sensitivity to insulin thus preventing progression of Type 2 diabestes which can lead to increased susceptibility for periodontitis.Increased physical activity can reverse the resistance for insulin.[6] So many studies have showed that there is a relation between insulin sensitivity and physical activity.[6,7,14] One more possible mechanism is that which is similar to the one for colon cancer: There are studies to suggest that physical activity reduces prostaglandin (PGE2) synthesis thus providing protection against colon cancer. Similarly may be PGE2 synthesis in the gingival tissues is reduced by physical activity and subsequently protect against periodontal destruction.[15]

Increased consumption of kilocalories due to physical activity may help in protection against developing obesity which again is one of the risk factor for periodontitis.[8,6]

The results of this study, as shown in Table 3, do not show a significant relationship between physical activity and periodontitis prevalence, which is similar to the findings of two cross-sectional studies, one conducted in Japan by Shizukuishi S et al[16] and the other in Finland by Sakki TK et al[17], both of which found no link between physical activity and periodontitis. In a study conducted in Finland, 780 55-year-old participants were studied to see if there was a link between periodontitis and physical activity.[17] A study of 310 Japanese workers looked at the link between periodontitis and their lifestyle.[16] Both research' findings have been published. The results of both these studies is in accordance with our study.

The sample size of both studies were small. The questionnaire about physical activity was not extensive.

Studies done Al-Zahrani et al[4] and Merchant et al[18] showed a significant relationship between physical activity and periodontitis. Both of these studies had large sample size.

In this study, 47% of the high physical activity group participants had Probing Pocket Depths of 4mm or more. The possible reason for this is due to the fact that a significant number of the High physical activity participants were from the manual labour occupations, wherein there is little regard for rigorous oral hygiene practices.

In our study the overall prevalence of localized periodontitis is 83% and the overall prevalence of generalized periodontitis is 17%.

As shown in *Table 1* the prevalence of localized periodontitis is quite high in all the groups and generalized periodontitis is low, but, there is not much of difference in relation to severity of periodontitis between the groups. Generalised periodontitis was mostly seen in individuals who were categorised as "No" under brushing habits (i.e. those participants who use other aids for cleaning the teeth) again strongly showing the relationship between oral hygiene habits and periodontal disease.

The CAL ≥ 3mm was recorded in all subjects of our study, which is slightly more than the findings of the study by Kathy. R. Phipps et al[19] (82% patients had CAL ≥5 mm). Cross-sectional studies most of the times have related the prevalence and severity of CAL to age and the current view sees that due to life time disease accumulation there is higher periodontal destruction in the elderly and not due to age specific condition.

Our findings back up this assertion; for example, in our sample, older males had a higher prevalence and severity of CAL but not PPD. This finding does not refute the existing view that periodontitis is not an age-related disorder, but it does show that there is an increased risk of progressing periodontal disease as dental hygiene deteriorates. There was higher prevalence of plaque in older men. As individuals get old and become weak, they are physically not that able to perform daily oral hygiene measures, hence increasing their risk of progression of disease.[19]

Out of the 90 participants in this study, 57 had „*Regular*ʺ brushing

habits with 12% having a 4mm or more PPD, 22 had „*Irregular*ʺ brushing habits with 50% having a 4mm or more PPD, and 11 participants had

„*No*ʺ brushing habits with 91% having a 4mm or more PPD. Hence a possible explanation for the lack of association among the threegroups with respect to physical activity levels may be attributed to the variability of oral health practices, which inturn may reduce the benefit which can be attributed to physical activity on the status of periodontal health.[20]

Since data are cross-sectional, it is not possible to establish whether physical inactivity actually causes periodontitis, or whether the effects are due to some other mechanisms. Other limitations of our study include the low sample size & that majority of participants had different oral hygiene habits compared to the other groups, which could be a confounding factor.

The study's strength is that patients with diabetes or who were current smokers were removed from the trial to prevent confounding caused by these well-known risk factors.

## Conclusion

Treatment plans for older adults are usually based on data from studies involving younger, healthier participants. Our study shows that irrespective of the levels of physical activity performed by the subjects they still experienced periodontitis which was shown to be related to their brushing habits. These findings suggest that as age advances, individuals become frail and are not as physically competent as their young counterparts. This in turn may effect on their ability to maintain adequate oral hygiene. Thus, dental practitioners should plan treatment for older individuals differently.

This study, as stated earlier, has a lesser sample size and is also a cross sectional study, due to which possible correlations between periodontitis and the levels of physical activity cannot be clearly defined.

Longitudinal and interventional studies with respect to periodontitis and physical activity are less in number, hence there is requirement for further investigation and research on the association between periodontal infection and the levels of physical activity.

It was found that the prevalence of localized periodontitis is more in all levels of physical activity and correlation of prevalence of localized or generalized periodontitis between each groups does not show much variation indicating that the level of physical activity does not have much influence on the severity of periodontal disease. Periodontal disease showed significant correlation with the brushing habits of the subjects.

**Conflict of Interest** – NIL

**Source of Funding –** SELF

**Ethical Clearance-** Taken from Institutional ethics committee

## References

1. Paivi Siukosaari, Shilpi Ajwani, Anja Ainamo, Juhani Wolf and Timo Narhi. Periodontal health status in the elderly with different levels of education: a 5-year follow-up study. Gerodontology 2012; 29: e170–e178.
2. Bawadi HA, Khader YS, Haroun TF, Al-Omari M, Tayyem RF. The association between periodontal disease, physical activity and healthy diet among adults in Jordan. J Periodont Res 2011; 46: 74–81.
3. Ogawa H, Yoshihara A, Hirotomi T, Ando Y, Miyazaki H: Risk factors for periodontal disease progression among elderly people. J Clin Periodontol 2002; 29: 592–597. Copyright Blackwell Munksgaard, 2002.
4. Mohammad S. Al-Zahrani, Elaine A. Borawski, Nabil F. Bissada. Increased physical activity reduces prevalence of periodontitis. Journal of Dentistry (2005) 33, 703–710.
5. Sanders AE, Slade GD, Fitzsimmons TR, Bartold PM. Physical activity, inflammatory biomarkers in gingival crevicular fluid and periodontitis. J Clin Periodontol 2009; 36: 388–395.

6. Lisa Miles, Nutrition Scientist, British Nutrition Foundation, High Holborn House, 52-54 High Holborn, London WC1V 6RQ, UK.. Physical activity and health. Journal compilation © 2007 British Nutrition Foundation *Nutrition Bulletin*, 32, 314–363.
7. I-Min Lee, Eric J Shiroma, Felipe Lobelo, Pekka Puska, Steven N Blair, Peter T Katzmarzyk, for the Lancet Physical Activity Series Working Group. Effect of physical inactivity on major non- ommunicable diseases worldwide: an analysis of burden of disease and life expectancy. *Lancet* 2012; 380: 219–29.
8. Khader YS, Bawadi HA, Haroun TF, Alomari M, Tayyem RF. The association between periodontal disease and obesity among adults in Jordan. J Clin Periodontol 2009; 36: 18–24.
9. Saxlin T, Ylo¨stalo P, Suominen-Taipale L, Ma¨nnisto¨ S, Knuuttila M. Association between periodontal infection and obesity: results of the Health 2000 Survey. J Clin Periodontol 2011; 38: 236–242.
10. Periodontal disease in men. Perio 2000. Vol. 61, 2013, 252-265
11. Age and sex relationships of superinfecting microorganisms in periodontitis patients. Slots J[1], Feik D, Rams TE**.** Oral Microbiol Immunol. 1990 Dec;5(6):305-8
12. Guidelines for Data Processing and Analysis of the International Physical Activity Questionnaire (IPAQ) – Short and Long Forms. November 2005.
13. Löe, H. The Gingival Index, the Plaque Index and the Retention Index Systems. Journal of Periodontology, Vol. 38, No. 6 (November-December 1967), pp. 610-6,
14. Saruta Saengtipbovorn and Surasak Taneepanichskul. Effectiveness of lifestyle change plus dental care (LCDC) program on improving glycemic and periodontal status in the elderly with type 2 diabetes. Saengtipbovorn and Taneepanichskul BMC Oral Health 2014, 14:72.
15. Mohammad S. Al-Zahrani, Elaine A. Borawski, Nabil F. Bissada. Periodontontitis and Three Health-Enhancing Behaviors: Maintaining Normal Weight, Engaging in Recommended Level of Exercise, and Consuming a High-Quality Diet. J Periodontol. August 2005. Volume 76, Number 8, Page 1362.
16. Shizukuishi S, Hayashi N, Tamagawa H, Hanioka T, Maruyama S, Takeshita T, et al. Lifestyle and periodontal health status of Japanese factory workers. Annals of Periodontology 1998;3:303–11.
17. Sakki TK, Knuuttila ML, Vimpari SS, Hartikainen MS. Association of lifestyle with periodontal health. Community Dentistry and Oral Epidemiology 1995;23:155–8.
18. Sakki TK, Knuuttila ML, Vimpari SS, Hartikainen MS. Association of lifestyle with periodontal health. Community Dentistry and Oral Epidemiology 1995;23:155–8.
19. Kathy R. Phipps, Benjamin K. S. Chan, Marie Jennings-Holt, Nico C. Geurs, Michael S.Reddy, Cora E. Lewis and Eric S. Orwoll. Periodontal health of older men: the MrOS dental study. Gerodontology 2009; 26: 122–129
20. Zimmermann H. Is frequency of tooth brushing a risk factor for periodontitis? A systematic review and meta-analysis. Community Dent Oral Epidemiol. 2014 Sep 26.