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## Assessment of physical activity and inactivity risk in sedentary individuals

**Ajit Dabholkar, Surabhi Naik and Tejashree Dabholkar**

### Abstract

Physical activity (PA) is defined as any bodily movement produced by skeletal muscle that required energy expenditure. A sedentary lifestyle is a type of lifestyle with little or no physical activity which include sitting or lying down (with the exception of sleeping), watching television, mobile and computer use. The study examined the sedentary time and low levels of daily lifestyle physical activity using validated Rapid Assessment Disuse Index (RADI) and identify the level of activity using International Physical Activity Questionnaire – Short-form (IPAQ -SF). In the study conducted, out of 110 Sedentary Individuals; RADI shows that Male are more prone to sedentary lifestyle than Female and shows more inactivity risk as compared to female and IPAQ-SF shows that Male are more Physically active than Female. In both Men and Women have different level of physical activity. Therefore, present study shows that Male and Female have different perspective related to PA.

**Keywords:** Physical activity, sedentary lifestyle, international physical activity questionnaire (IPAQ), rapid assessment disuse index (RADI)

### Introduction

Humans are spending increasingly more time in sedentary behaviours, and this global trend is likely to continue, given the increasing availability and popularity of personal computers and television, automation of chores at home, increase in sedentary occupations, and transportation trends.<sup>[1]</sup> Sedentary behaviour defined in various ways (e.g., sitting, television-watching, energy expenditure of 1.0 to 1.5 metabolic equivalent tasks [METs]) has been associated with increased risk of obesity, metabolic syndrome, type 2 diabetes, and cardiovascular disease (CVD) mortality, suggesting that it be treated as a construct distinct from physical activity.<sup>[1]</sup>

Physical activity is defined as any bodily movement produced by skeletal muscles that results in energy expenditure.<sup>[2]</sup> Physical activity/exercise is examined as primary prevention against 35 chronic conditions [Accelerated biological aging/premature death, low cardiorespiratory fitness (VO<sub>2</sub>max), sarcopenia, metabolic syndrome, obesity, insulin resistance, prediabetes, type 2 diabetes, non-alcoholic fatty liver disease, coronary heart disease, peripheral artery disease, hypertension, stroke, congestive heart failure, endothelial dysfunction, arterial dyslipidemia, haemostasis, deep vein thrombosis, cognitive dysfunction, depression and anxiety, osteoporosis, osteoarthritis, balance, bone fracture/falls, rheumatoid arthritis, colon cancer, breast cancer, endometrial cancer, gestational diabetes, preeclampsia, polycystic ovary syndrome, erectile dysfunction, pain, diverticulitis, constipation, and gallbladder diseases].<sup>[3]</sup>

Moderate- to vigorous-intensity physical activity has an established preventive role in cardiovascular disease, type 2 diabetes, obesity, and some cancers. However, recent epidemiologic evidence suggests that sitting time has deleterious cardiovascular and metabolic effects that are independent of whether adults meet physical activity guidelines. Evidence from “inactivity physiology” laboratory studies has identified unique mechanisms that are distinct from the biologic bases of exercising.<sup>[4]</sup>

WHO recommended Benefits of Physical Activity for Young People; Appropriate practice of physical activity assists young people to:

- Develop healthy musculoskeletal tissues (i.e. bones, muscles and joints);
- Develop a healthy cardiovascular system (i.e. heart and lungs);
- Develop neuromuscular awareness (i.e. coordination and movement control);
- Maintain a healthy body weight.

The emerging evidence of the effects of sedentary time on health outcomes suggests a need to better measure this exposure. RADI (Rapid Assessment Disuse Index) is a brief assessment tool for use in time-constrained clinical practice. It is based on three questions from the Yale Physical Activity Survey, pertaining to general domains of daily activity (Example: moving about and climbing stairs) and sitting behaviour. RADI is self-administered and is presented as a matrix that can be completed in 5 min or less.<sup>[6]</sup>

The Rapid Assessment Disuse Index (RADI) could assist in providing recommendations for decreasing sedentary behaviour and increasing lifestyle activity at the point of care.

1. It could be integrated into a sedentary behaviour/lifestyle activity prescription for which specific goals would be set jointly by the patient and clinician based on the RADI score.
2. Future research, however, is needed that explores ways to effectively integrate RADI into clinical practice.<sup>[6]</sup>

According to author Mondragon-Cardona,<sup>[7]</sup> Data from 100 subjects with a mean age of 43±18 years were collected. 6% of the population did not perform any kind of physical activity, while 61% performed vigorous physical activity. Men spent more time in doing vigorous and moderate physical activity than women did ( $p<0.05$ )

According to author Kerem Shuval,<sup>[6]</sup> RADI was temporally stable (intraclass correlation coefficients 0.79), and a higher score was significantly correlated with greater sedentary time ( $\rho=0.40$ ;  $p<0.01$ ), fewer sedentary to active transitions ( $\rho=-0.42$ ;  $p<0.01$ ), and less light-intensity physical activity ( $\rho=-0.40$ ;  $p<0.01$ ). The ability of RADI to detect patients with high levels of sedentary time was fair (AUC=0.72). This brief assessment tool, designed to quickly identify patients with high levels of sitting and low daily physical activity, exhibits good reliability and moderate validity. RADI can assist in providing recommendations at the point of care pertaining to modifying sedentary behaviour.

The International Physical Activity Questionnaire (IPAQ) is used as a standardised measure to estimate habitual practice of physical activities of populations from different countries and socio-cultural contexts. Two-forms of the International Physical Activity Questionnaire (IPAQ) test have been

developed: a short and a long version, both of which involve 7-day recall of physical activity. The short-form (SF) was designed for use in surveillance studies, in which time is limited, and consists of 8 items to estimate the time spent performing physical activities (moderate to vigorous) and inactivity (time spent sitting).<sup>[5]</sup>

These studies encouraged us to use International Physical Activity Questionnaire (IPAQ-SF) to assess level of physical activity in Sedentary Individuals aged between 15 to 55 and also RADI (Rapid assessment disuse index) to identify daily activity (example: moving about and climbing stairs) and sitting behaviour in Sedentary individuals.

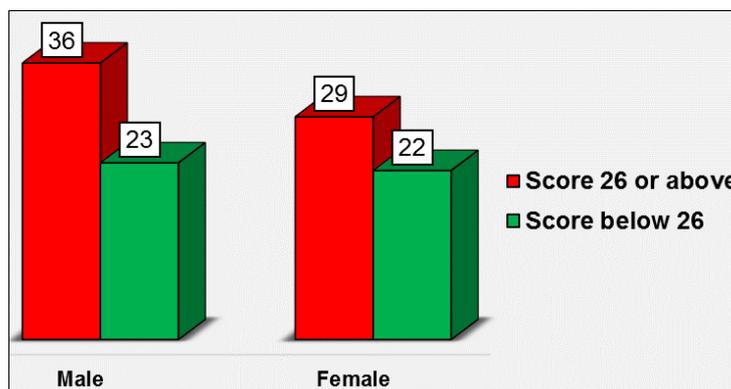
**Materials and Methodology**

It was a cross-sectional study and the data has been collected by direct method from various sectors like Auto-drivers, Desk workers (Staff members), Bank Workers with more of sitting time and low level of physical activity. 110 subjects were included in this survey between the age group of 15-55 years and also subjects with occupation of sitting and low level of physical activity included in this study. The Demographic Details like Age, Gender, Height, Weight, BMI was documented. With the help of International Physical Activity Questionnaire Short (IPAQ-SF); The IPAQ scoring protocol assigns the following MET values to walking, moderate, and vigorous intensity activity: 3.3 METs, 4.0 METs, and 8.0 METs, respectively. The MET values of respective subjects were calculated and on that basis they were quantified into inactive, moderate active or HEPA active. Subjects were considered to have met ACSM physical activity recommendations if they reported at least 150 min/week of walking, moderate, or vigorous intensity physical activity. The ‘‘Rapid Assessment Disuse Index (RADI)’’ is a validated tool and it includes Walk + Stairs + Sit for each one day of the Past Week; Month; Year which gives Cumulative Inactivity Risk Index Score.

**Results and Discussion**

In the study conducted, out of 110 Sedentary individuals 59 were Male and 51 were Female.

**Figures and Tables**



**Fig 1:** RADI Scoring in Male and Female Sedentary Individuals

**Table 1:** RADI Scoring in Male and Female Sedentary Individuals

RADI Score	Score 26 or more	Score less than 26	Total
Units	No. of subjects		No. of subjects
Gender	No. of subjects		No. of subjects
Male	36	23	59
Female	29	22	51

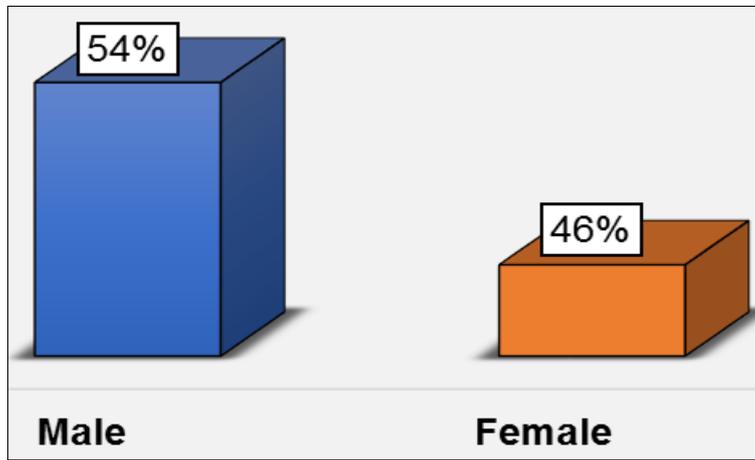


Fig 2: Cumulative Inactivity Risk Index

Table 2: Cumulative Inactivity Risk Index

Cumulative Inactivity Risk Index	Male	Female
	54%	46%

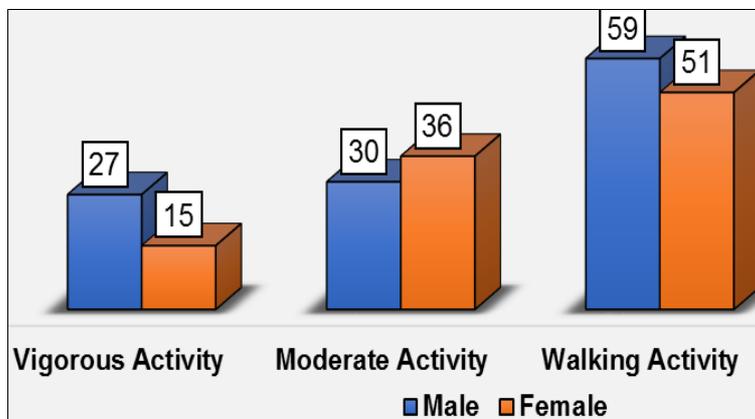


Fig 3: Activity Analysis of Male and Female in Sedentary Individuals

Table 3: Activity Analysis of Male and Female in Sedentary Individuals

Activity Analysis	Vigorous Activity		Moderate Activity		Walking Activity	
	No. of subjects	Percentage (%)	No. of subjects	Percentage (%)	No. of subjects	Percentage (%)
Male	27	23%	30	26%	59	51%
Female	15	15%	36	35%	51	50%

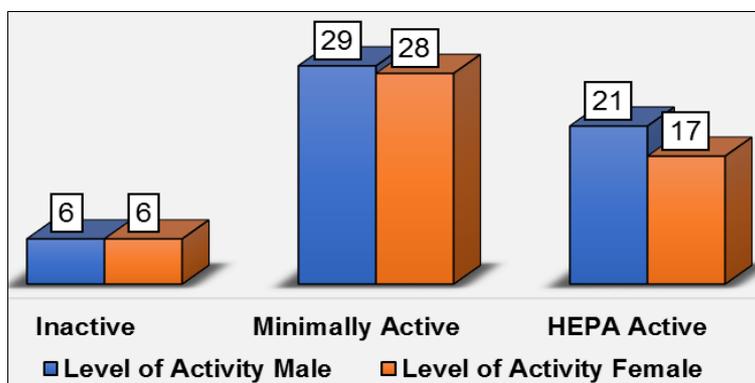


Fig 4: Level of Activity in Male and Female Sedentary Individuals

Table 4: Level of Activity in Male and Female Sedentary Individuals

Level of Activity	Inactive		Minimally Active		HEPA Active	
	No. of subjects	Percentage (%)	No. of subjects	Percentage (%)	No. of subjects	Percentage (%)
Male	6	11%	29	52%	21	37%
Female	6	12%	28	55%	17	33%

## Discussion

With changing social and economic patterns all over the world, sedentary lifestyles have become a worldwide phenomenon. Sedentary lifestyles are associated with increased obesity, type 2 diabetes, and cardiovascular disease, and hence the promotion of active lifestyles is an important public health priority.

This is a cross-sectional study and is aimed to assess the levels of physical activity and inactivity. 110 Individuals took part in survey. Out of 110 Subjects 59 were male and 51 were Female between age group of 15 to 55. Regular engagement in physical activity offers many well-established health benefits, including reduced risk of obesity, type 2 diabetes, cardiovascular disease, and some cancers

## Rapid Assessment Disuse Index (RADI)

Rapid Assessment Disuse Index is first such instrument designed for a clinical setting that can be utilized by providers and patients to identify and modify sedentary time and physical inactivity which are modifiable risk factors for chronic diseases.

## According to RADI score and Gender (According to Figure 1.)

(Patients receiving an RADI score of 26 or higher should reduce this score by decreasing sitting as well as increasing lifestyle activity or in short they are under inactivity risk.)

Study findings reveal that; out of 110 Subjects, in which 59 were Male and 51 were Female, in male 36 subjects receive a RADI score of 26 or above while as in Female 29 subjects scored 26 or above.

## This leads to the next figure which is the Cumulative Inactivity Risk Index and Gender (According to Figure 2.)

- Out of 59 Male subjects; the percentage of Cumulative Inactivity Risk Index is 54%
- Out of 51 Female subjects; the percentage of Cumulative Inactivity Risk Index is 46%

Therefore, out of 110 Subjects Male are prone to sedentary lifestyle than Female.

According to Cumulative Inactivity Risk Index, 54% male are under Inactivity risk and 46% of female are under Inactivity risk.

## Therefore, RADI Shows that Male are more prone to Sedentary lifestyle and are under inactivity risk than Female

International Physical Activity Questionnaire-Short Form According to WHO, physical activity needs to achieve at least 1200 MET-min/week. The average MET values of 110 Sedentary Individuals is 3837.07 METS, which is over and above the WHO criteria.

## According to Activity Analysis and Gender (According to Figure 3.)

Activity analysis shows in Male and Female is Walking activity were done regularly were as Moderate and Vigorous activity has not done regularly in past 7 days.

## According to Level of Activity and Gender (According to Figure 4.)

Therefore, out of 110 Sedentary Individuals; 59 were male and 51 were female in which Male and Female are equally inactive whereas Male are more Minimally and HEPA active than Female.

## Therefore, International Physical Activity Questionnaire – Short form (IPAQ-SF) shows that Male are more physically active than Female.

Our data showed marked differences between males and females on the prevalence of inactivity. In both Men and Women have different level of physical activity. Thereby, health professionals must be aware of their potential to mediate health behaviour, not only among sick individuals, but also population as a whole.

## Conclusion

Rapid Assessment Disuse Index shows that Male are more prone to sedentary lifestyle than Female and shows more inactivity risk as compared to female and International Physical Activity Questionnaire- Short Form (IPAQ-SF) shows that Male are more Physically active than Female.

“In conclusion, every individual has a different perspective related to Physical Activity.”

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