# Prevalence and determinants of Physical Inactivity among Diabetic and Hypertensive Patients, Baghdad-Iraq, 2015-2016

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**Abstract:**

**Background:** The prevalence of NCDs is increasing throughout the world. Lifestyles changes particularly, unhealthy diets and lack of physical activity (PA) have been contributed to the increased prevalence of NCDs. Globally, the prevalence of physical inactivity (PI) is about 31%, however there is insufficient data about prevalence and determinants of PI among adults with Hypertension (HTN) and/or Diabetes (DM) in Baghdad.

**Objectives:** The objective of this study is to measure the prevalence and identify high risk groups of PI among adults with HTN and DM in Baghdad, Iraq, 2015-2016.

**Methods:** A cross-sectional study was conducted among a representative sample of 584 adults with HTN and/or DM (age≥18 years) who attended primary health care centers in Baghdad, Iraq. Data were collected using structured questionnaire to gather socio-demographic information of the participants. 16-item Global Physical Activity Questionnaire (GPAQ), which was administered in face-to-face interviews, developed by WHO and incorporated within the WHO Stepwise instrument, and scored as per standard protocols used to measure the PA variables. A metabolic equivalent task (MET) score of less than 600 indicates the presence of PI.

**Results:** The total participants were 584. Overall, PI was found to be 57.5% (95% CI: 53.49%-61.51%).The study population was found to be least active in the leisure time domain (6.7%) compared with the work (45.7%) and transport (47.6%) domains. Binary analysis revealed the following risk factors: Age, sex, marital status, occupation, educational level, hypertension, combined hypertension and diabetes, BMI, and PA advice. Logistic regression analysis applied and revealed the following un-confounded risk factor: Aging (OR=1.047), Divorced or Widowed (OR=1.323), Retired or housewives (OR=1.331), Illiterate level of education (OR=1.439), obesity (OR=1.46) and lack of PA advice (OR=3.443).

**Conclusion:** more than half of HTN and/or DM subjects in Iraq was physically inactive. Low education, obesity and lack of advice were the most important modifiable risk factors.

**Keywords:** Physical inactivity, Iraq, hypertensive, diabetic, prevalence

## Introduction:

Noncommunicable diseases (NCDs) are the leading cause of global disease burden, with 80% of NCD mortality occurring in low- and middle-income countries (LMICs). They are generally of long duration, and slow progression[1].

In 2012, NCDs, primarily cardiovascular diseases (CVD), cancers, chronic respiratory diseases and diabetes mellitus (DM), are responsible for 38 million deaths out of 56 million global deaths. This number is projected to increase to 52 million by 2030[2]. These four groups of NCDs account for 82% of all NCD deaths[3]. NCDs are responsible for 48% of the healthy life years lost (Disability Adjusted Life Years–DALYs) worldwide. In Iraq, NCDs kill about 167,000 people each year, which represents about 62% of total deaths[4].

Diabetes mellitus (DM) and hypertension (HTN) have emerged as major medical and public health issues worldwide, and both are important risk factors for coronary artery disease (CAD), heart failure, and cerebrovascular disease[5].

DM is increasing in epidemic proportions globally. According to the WHO, the prevalence of DM in adults worldwide was estimated to be 4.0% in 1995 and is predicted to rise to 5.4% by the year 2025 such that the number of adults with DM in the world would rise from 135 million in1995 to 300 million in the year 2025[5].

HTN affects about one billion people worldwide and it is estimated that by 2025, up to 1.56 billion adults worldwide will be hypertensive. Raised blood pressure (BP) is estimated to cause 7.5 million deaths, which accounts for 57 million DALYs[5].

NCDs are largely preventable and driven by forces that include ageing, rapid unplanned urbanization, and the globalization of unhealthy lifestyles. Tobacco use, physical inactivity (PI), unhealthy diet and the harmful use of alcohol increase the risk of NCDs, and if these major risk factors were eliminated, around 75% of heart disease, stroke and type 2 DM would be prevented; and 40% of cancer would be prevented[6].

Globally, dietary risk factors and PI were responsible for the largest disease burden. PI is one of the 10 leading risk factors for global mortality, causing some 3.2 million deaths each year. In 2010, PI caused 69.3 million DALYs – 2.8% of the total – globally[7]. In 2010, 23% of adults aged 18 years had PI. Women were less active than men and older people were less active than younger people[8]. In Canada, 2009, the estimated health care costs of PI was $6.8 billion, which represented 3.7% of the overall health care costs[9].

Large proportion of the world's population remains physically inactive. To quantify the impact of PI on the world's major NCDs, it is important to estimate how much of these diseases could be

averted in the population if those inactive were to become active, as well as how much gain in life expectancy could occur at the population level[10].

The **objectives** of this study were to measure the prevalence and identify high risk groups of PI among adults with HTN and DM in Baghdad province, Iraq, 2015-2016.

## Subjects and Methods:

### Study Design and Setting:

This is a cross-sectional study that was conducted in nine primary healthcare centers (PHCCs) and three medical popular clinics (MPCs) in Al-Russafa side of Baghdad city during a period of six months (Nov, 2015 – Apr, 2016). A random sample of three Districts were selected from Baghdad Al-Russafa health directorate, then a random sample of three PHCCs and one MPCs from each of the selected Districts were included.

### Study Population and sample size:

The study population included all adult hypertensive and/or diabetic (type1 and type2) male and female individuals aged 18 years or more who attended the selected PHCCs or MPCs for any complaint. Patients that have any comorbid illnesses that interfere with PA were excluded. Similarly, those with severe complications that make the interview not feasible were also excluded. The sample size was calculated using the following equation: $n= (z^2pq)/d^2$ in which n= sample size, z= 1-α/2 percentile of a standard normal distribution = 1.96, p= expected proportion (unknown, so we assume 0.5), q= 1-p, and d= absolute precision = 0.05.

The estimated sample was 384, but we included 584 respondents to consider any non-response.

### Data Collection Tools:

Two questionnaires had been applied and filled through direct interview with the study population. The first questionnaire used to gather information on certain socio – demographic variables (age, sex, marital status, approximate monthly income, occupation, residence and educational level), information about HTN, DM (or both) and certain risk factors (smoking and alcohol drinking) and information whether they received any advice on PA. Weight and height were recorded using the standard procedures. Weight was measured with beam scale that was kept on a firm horizontal surface and was recorded to the nearest 0.5 Kg. Height was measured with a tape to the nearest cm. Subjects were requested to stand upright without shoes with their back against the wall, heels together and eyes directed forward. Body Mass Index (BMI) is calculated by weight (kilograms) divided by the square of height (meters) and categorized according to WHO classification[11].

The second questionnaire was applied to measure the PA variables by using the 16-item Global Physical Activity Questionnaire (GPAQ), developed by WHO and incorporated within the WHO Stepwise instrument, and scored as per standard protocols[12].

GPAQ covers several components of PA, such as intensity, duration, and frequency, and assesses three domains in which PA is performed (occupational PA, transport-related PA, and PA during discretionary or leisure time). Duration and frequency of PA (min/day) participation in these domains over a typical week were recorded. Activities are classified into three intensity levels: vigorous (8 metabolic equivalent task; METs), moderate (4 METs) and inactivity (1 MET) [13].

GPAQ comprises 16 questions grouped to capture PA undertaken in these three different behavioral domains. Within the work and discretionary domains, questions assess the frequency and duration of two different categories of activity defined by the energy requirement or intensity (vigorous- or moderate-intensity). In the transport domain, the frequency and duration of all walking and cycling for transport is captured but no attempt is made to differentiate between these activities. One additional item collected time spent in sedentary activities.

GPAQ has been shown to be valid and reliable, but also adaptable to incorporate cultural and other differences[14].

On a continuous scale, participants were asked to report on their PA during a typical week. The average minutes per week were computed based on the participant's dichotomous response (yes or no) to whether they engaged in PA and the type, intensity, duration, and frequency of PA in which they participated. A sum total was created for participants who answered yes to engaging in PA based on the following equation: minutes engaged in PA multiplied by the average number of days per week engaged in PA. A summary variable of average minutes per week of moderate-to-vigorous PA (MVPA) was calculated for each domain of PA by combining the average minutes per week of both moderate and vigorous PA for each PA domain.

Total MET-min/day was calculated for each domain by first multiplying MET values by reported minutes with moderate-intensity and transport activities assigned a value of 4 MET and vigorous-intensity activities assigned a value of 8 MET, and then adding the total MET-min of vigorous- and moderate-intensity activities performed.

According to GPAQ guidelines, participants could be classified into two activity groups to reflect whether they are meeting weekly physical activity recommendations[13]:

• **Sufficiently active:** Participants engaged in:

1. At least 30-minute of moderate-intensity activity or walking per day on at least five days of a typical week, or

2. 20-minute of vigorous-intensity activity per day on at least three days of a typical week; or
3. 5 days of any combination of walking and moderate- or vigorous-intensity activities achieving a minimum of at least 600 MET-minute per week.

• **Inactive:** Those who did not meet one of the above-mentioned criteria.

**Pilot Study**:

Pilot study was implemented in one of PHCs on 10 patients

**Official approvals and Ethical considerations**:

Official approval was granted from the scientific committee in the department of community and family medicine which was later approved by the council of the college of medicine /Baghdad University. Official approval was granted from the Research committee in the Ministry of Health. Letter of facilitation were obtained from Baghdad College of medicine to Resafa Directorate of Health and the concerned PHCs and PMCs.

All patients were verbally informed about the study and they were asked the permission to be part of the study. All personal information were kept anonymous.

**Statistical analysis**: Statistical analysis was performed using SPSS windows version 22 Software. Student's t test and one-way ANOVA test were used for comparison between continuous variables, chi square and Fisher's exact probability test were used to test qualitative and frequency data. Logistic regression analysis was applied to identify the significant independent and un-confounded risk factors. P value <0.05 was considered significant.

**Results:**

This study involved 584 hypertensive and/or diabetic patients. The mean age of the patients was 48.9±11.8 years; 57.2% were females; 69.5% were currently married; and 82.5% were from urban areas. Around 73% had HTN, 53.3% had DM (92% type2 DM), and 27.1% had both HTN and DM. About 45% didn't complete their secondary school; 84.4% of females were housewives, and 72% of males were currently employed. Around 71% were non-smokers; 92.5% were non-alcohol drinkers; and 47.4% were obese.

The prevalence of PI among the patients was 57.5% with 95% C.I of 53.49% – 61.51%. Only 35.8% of the patients had been advised about the benefits of PA on HTN and DM, and doctors represented 39.3% of sources of advice.

Comparing physically active and inactive patients by certain socio-demographic variables revealed a positive association between PI and age (P=0.001). The prevalence increased from 19.5% among patients aged less than 20 years to more than 60% among those aged >60 years. PI was more common among females (63.2%) compared to males (50%) (P=0.001). Divorced or widowed patients had also higher prevalence of PI (74.3%) than currently married (54.7%) or single patients (20.6%) (P=0.001). The prevalence of PI was more among housewives and retirees (68.4% and 67.2%, respectively) than employed and unemployed (43.1% and 22.2%, respectively) (P=0.001). Patients with more than secondary school education showed the lowest prevalence of PI (49.7%) than other educational levels (P=0.023%).

Other studied variables like monthly income and residence did not show a significant association (P>0.05).

Comparing PA status among patients by HTN and DM showed that PI was more prevalent among hypertensive patients (63.3%) than non-hypertensive patients (41.7%) (P=0.001). PI was also more prevalent among patients having combined HTN and DM (67.1%) compared to those had either HTN or DM (54%) (P=0.002). DM condition did not show a significant association with PI (P>0.05). (Table 2)

Comparing PI among patients by BMI levels showed a positive association between PI and BMI levels (P=0.001) (table 2). PI was more prevalent among patients who didn't get advice regarding the benefits of PA (68.3%) than those who received the advice (38.3%) (p=0.001) (Table 2).

Logistic regression analysis was applied using PI as the dependent variable and the variables that showed significant association in the binary analysis as the independent variables. Six factors were found to be significant risk factors. These factors were aging (OR=1.047), Divorced or Widowed (OR=1.323), Retired or housewives (OR=1.331), Illiterate level of education (OR=1.439), obesity (OR=1.46) and lack of PA advice (OR=3.443). (Table 3)

In this study, the total MET were collected from three domains: work, transport and leisure time of each participant. The majority of the total MET was collected from transport (47.6%) and work (45.7%). Only 6.7% was from leisure time. (Fig 1)

**Table 1:** The distribution of the patients by physical activity status and certain socio-demographic characteristics.

| Variable | Activity status | | Total No: 584(%) | P-Value |
|---|---|---|---|---|
| | Inactive No: 336 (%) | Active No: 248 (%) | | |
| **Age Groups (years)** | | | | |
| < 30 | 7 (19.5%) | 29 (80.5%) | 36 (6.2%) | |
| 30 – 39 | 23 (29.9%) | 54 (70.1%) | 77 (13.2%) | |
| 40 – 49 | 116 (59.2%) | 80 (40.8%) | 196 (33.5%) | 0.001 |
| 50 – 59 | 99 (61.9%) | 61 (38.1%) | 160 (27.4%) | |
| ≥ 60 | 91(60.8%) | 24(39.2%) | 115 (19.7%) | |
| **Sex** | | | | |
| Male | 125 (50%) | 125 (50%) | 250 (42.8%) | |
| Female | 211 (63.2%) | 123 (36.8%) | 334 (57.2%) | 0.001 |
| **Marital Status** | | | | |
| Single | 7 (20.6%) | 27 (79.4%) | 34 (5.8%) | |
| Currently Married | 222 (54.7%) | 184 (45.3%) | 406 (69.5%) | 0.001 |
| Divorced or Widowed | 107 (74.3%) | 37 (25.7%) | 144 (24.7%) | |
| **Occupation** | | | | |
| Unemployed | 2 (22.2%) | 7 (77.8%) | 9 (1.6%) | |
| Employed | 100 (43.1%) | 132 (56.9%) | 232 (39.7%) | |
| Retired | 41 (67.2%) | 20 (32.8%) | 61 (10.4%) | 0.001 |
| Housewives | 193 (68.4%) | 89 (31.6%) | 282 (48.3%) | |
| **Residence** | | | | |
| Urban | 282 (58.5%) | 200 (41.5%) | 482 (82.5%) | |
| Rural | 54 (53.5%) | 47 (46.5%) | 101 (17.5%) | 0.351 |
| **Educational Level** | | | | |
| Illiterate | 75 (67.6%) | 36 (32.4%) | 111 (19%) | |
| Primary School | 84 (55.6%) | 67 (44.4%) | 151 (25.9%) | |
| Secondary School | 95 (60.5%) | 62 (39.5%) | 157 (26.9%) | 0.023 |
| Higher education | 82 (49.7%) | 83 (50.3%) | 165 (28.2%) | |
| **Monthly Income** | | | | |
| < 400.000 | 103 (62.4%) | 62 (37.6%) | 165 (29.1%) | |
| 400.000 – 1.000.000 | 187 (58.8%) | 131 (41.2%) | 318 (56.1%) | 0.168 |
| > 1.000.000 | 42 (50%) | 42 (50%) | 84 (14.8%) | |

**Table 2:** The distribution of the patients by activity status and presence of HTN and/or DM, BMI levels and Advice for PA

| Variable | Activity Status | | Total (n=584) | P-Value |
|---|---|---|---|---|
| | Inactive | Active | | |
| **HTN** | | | | |
| Hypertensive | 271 (63.3%) | 157 (36.7%) | 428 | 0.001 |
| Not Hypertensive | 65 (41.7%) | 91 (58.3%) | 156 | |
| **DM** | | | | |
| Diabetic | 171 (54.5%) | 143 (45.5%) | 314 | 0.105 |
| Not Diabetic | 165 (61.1%) | 105 (38.9%) | 270 | |
| **Combined HTN and DM** | | | | |
| Yes | 106 (67.1%) | 52 (32.9%) | 158 | 0.004 |
| No | 230 (54%) | 196 (46%) | 426 | |
| **BMI** | | | | |
| Normal | 53 (40.8%) | 77 (59.2%) | 130 | |
| Overweight | 97 (54.8%) | 80 (45.2%) | 177 | 0.001 |
| Obese | 186 (67.2%) | 91 (32.8%) | 277 | |
| **Advice regarding PA** | | | | |
| **YES** | 80 (38.3%) | 129 (61.7%) | 209 | 0.001 |
| **NO** | 256 (68.3%) | 119 (31.7%) | 375 | |
| **Total** | 336 | 248 | 584 | |

**Table 3:** The significant risk factors by Logistic regression analysis model

| Variable | OR | 95% C.I | P value |
|---|---|---|---|
| **Aging** | 1.047 | 1.027 – 1.067 | 0.001 |
| **Divorced or Widowed** | 1.323 | 1.012 – 1.729 | 0.041 |
| **Retired or Housewives** | 1.331 | 1.156 – 1.533 | 0.001 |
| **Illiterate** | 1.439 | 1.151 – 1.8 | 0.001 |
| **Obesity** | 1.46 | 1.206 – 1.766 | 0.001 |
| **Lack of PA advice** | 3.443 | 2.238 – 5.297 | 0.001 |

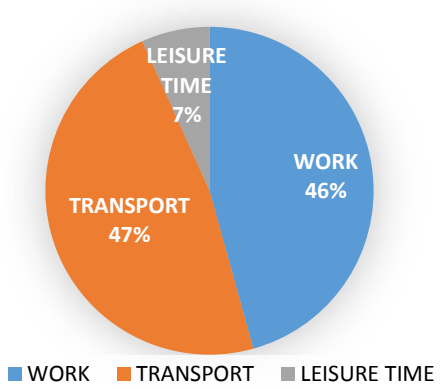


**Figure 1:** The distribution of MET collected in the study group by domains.

**Discussion:**

Around the world, PI is responsible for 6-10% of the major NCDs of CHD, type 2 DM, and breast and colon diseases and responsible for 9% of premature mortality[10]. The prevalence of PI among hypertensive and/or diabetic patients in this study was 57.5%. Lower figures were reported from studies conducted in some African countries as Mauritania (52.6%), Swaziland (49.1%), South Africa (44.7%), and Nigeria (19.2%) [15,16]and also in a study conducted in Bangladesh (35%) [17]. Higher figures were reported in studies conducted in Venezuela (68%) [18], USA (61%) [19], KSA (66.6%) [20]. The level of PI reported in this study is the same as the level reported in the step wise survey that was conducted in Iraq, 2006 (56.7%) [21]. Almost similar figures were reported from Arab Gulf countries in which the PI ranged between 57.9%-61% for men and 71.6%-73.7% for women[22]. This wide variations of PI might be due to the definition of PI and the method of data collection.

The higher prevalence of PI among females is concordant with studies in Gulf countries [22,23], Belgium [24], USA [25], Nigeria [26] and Vietnam [27]. Women in Iraq and many countries in the region are less engaged in work, and consequently transportation. Meanwhile for cultural and social reasons they are less engaged in sport activities.

The positive association with age is quite expected and consistent with studies conducted in other parts of the world [28,29,30]. Older age people are more likely to be retired, and again engagement in outdoor or indoor sport activities is not common in our society.

The higher prevalence of PI among the divorcees or widowed when compared with the other marital status groups is consistent with the National Health Interview Survey (NHIS) which stated that widowed men and women were more likely than other marital status groups to never be physically active. [31]. The most likely explanation of this result is that widowed persons tend to be older and engaged less in domestic and recreational PA.

This study revealed a negative association between PI and level of education. Similar findings were reported in studies conducted in Denmark[32] and Australia[33]. An association of lower levels of education in relation to PI had also been demonstrated in the Third National Health and Nutrition Survey (NHANES III) data in adults with type 2 DM. Those with less than a high school degree were more likely to report PI as compared with those with a college degree[34].

Retirees and housewives in this study were more likely to be physically inactive compared to currently employed subjects. The levels of PA have been shown to be related to occupational class in studies conducted in Ireland[35] and Canada[36].

Income was not a significant factor affecting PI in this study. This finding does not conform to the findings in other studies, in which income was found to assert a positive association with the propensity for participation inPA[37].

In this study, obese adults were less active than adults with a BMI in the healthy range. Obesity is an independent risk factor for several chronic

diseases such as type 2 DM, CVDs, stroke, and several cancers. Similar findings were reported in study conducted in Mexico[38] and Finland[39]. An association of higher BMI in relation to PI had also been demonstrated in the NHANES III data in adults with type 2 DM. [34]

While two thirds of hypertensive patients were inactive in the current study, lower figures were reported from studies conducted in USA[40] and Finland[39]. In this study, DM was not a significant factor affecting PA status. Different findings were reported from studies conducted in USA[40], Nigeria[41], and Brazil[42].

One of the most important factors affecting PA status was the advice received by the patients particularly from their treating physicians regarding the beneficial effects of PA. This factor can make a real difference in PA status among HTN and DM patients.

The study population was found to be least active in the leisure time domain compared with the work and transport domains. A similar pattern seen in other developing countries[43,44]. In the coming years it is likely that work activity will decrease and may not be replaced with active transport and leisure, a trend seen in both developed and developing countries[45].

The sedentary behavior of the respondents revealed an average total sitting time of about seven hours per day; a behavior which increases with age. This should call for concern because of numerous disadvantage of a sedentary lifestyle. Time spent sedentary is strongly and adversely associated with poor cardio-metabolic health and may be a more important indicator of poor health[46]. A clear dose-response relationship between daily sitting time and all-cause and CVD mortality was evident as well as compelling evidence that sedentary behaviors such as sitting and TV viewing are related to premature mortality in diabetes[47].

In conclusion, more than half of hypertensive and/or diabetic subjects in Iraq was physically inactive. Low education, obesity and lack of advice were the most important modifiable risk factors. Barriers to PA in Iraq are diverse and includes cultural factors as competing family demands, such as childcare and household chores, economic constraints as lack of affordable leisure facilities, and poor civil infrastructure particularly lack of outdoor spaces for sports parks and poor public transport systems that make people rely on using own cars.

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