The burden of non-communicable diseases attributable to physical inactivity in Türkiye

Türkiye'de fiziksel inaktiviteye atfedilen bulaşıcı olmayan hastalık yükü

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Abstract

Physical inactivity is a major risk factor for non-communicable diseases (NCDs) globally. In Türkiye, the prevalence of physical inactivity is notably high, ranking third in Europe, with 44.4% of the population classified as physically inactive. This study aims to estimate the population attributable fractions (PAFs) of coronary heart disease, type 2 diabetes (DM), stroke, dementia, depression, and hypertension cases, deaths and disability-adjusted life-years (DALYs) due to physical inactivity in Türkiye.

Data on physical inactivity prevalence and NCDs' incidences, mortalities and DALYs were sourced from recent national surveys and Global Burden of Disease study. Relative risks (RRs) were obtained from global meta-analyses. PAFs were calculated using Levin's equation.

PAFs of physical inactivity were 16.7% for dementia, 11.6% for depression, 9.5% for stroke, 8.8% for CHD, 7.1% for type 2 diabetes and 3.1% for hypertension. Between 3.7% (for hypertension) and 17,5% (for dementia) of NCD deaths and 3.4% (for hypertension) and 17.1% (for dementia) of the DALYs due to NCDs examined in this study were attributable to insufficient physical activity. The burden was more significant among women and older ages.This study emphasizes the need for promoting physical activity and implement interventions focusing particularly on women and the elderly to reduce the burden of NCDs in Türkiye.

Keywords: Physical inactivity, non-communicable disease, populaton attributable fraction

Özet

Fiziksel inaktivite, tüm dünyada bulaşıcı olmayan hastalıklar (BOH) için en önemli risk faktörlerindendir. Türkiye, %44,4'lük fiziksel inaktivite prevalansı ile Avrupa'da üçüncü sırada yer almaktadır. Bu çalışmanın amacı, Türkiye'de fiziksel inaktiviteye atfedilen koroner kalp hastalığı, tip 2 diyabet (DM), inme, demans, depresyon ve hipertansiyon vaka sayısı, mortalitesi ve engelliliğe göre ayarlanmış yaşam yıllarını belirlemektir.

Fiziksel inaktivite prevalansı ile BOH'ların insidansları, mortaliteleri ve ve engelliliğe göre ayarlanmış yaşam yılları verileri ulusal çalışmalardan ve Küresel Hastalık Yükü çalışmasından elde edilmiştir. Rölatif riskler (RR) yakın zamanda yapılan meta-analizlerden alınmıştır. Topluma atfedilebilir fraksiyonlar Levin'in denklemine dayanarak hesaplanmıştır.

Fiziksel inaktivitenin topluma atfedilebilir fraksiyonları demans için %16,7, depresyon için %11,6, inme için %9,5, KKH için %8,8, tip 2 DM için %7,1 ve hipertansiyon için %3,1'di. BOH nedenli ölümlerin fiziksel aktiviteye atfedilebilirliği %3,7 (hipertansiyon) ile %17,5 (demans); engelliliğe göre ayarlanmış yaşam yıllarınının fiziksel aktiviteye atfedilebilirliği %3,4 (hipertansiyon) ile %17,1 (demans) aralığında değişmekteydi. Kadınlarda ve artan yaşla fiziksel inaktiviteye atfedilen BOH fraksiyonu artmaktaydı. Türkiye'de BOH yükünü azaltmak için fiziksel aktivitenin desteklenmesine ve özellikle kadınlar ve yaşlılara odaklanan müdahalelere ihtiyaç vardır.

Anahtar Kelimeler: Fiziksel inaktivite, bulaşıcı olmayan hastalıklar, topluma atfedilirlik fraksiyonu

Introduction

Physical inactivity is defined by the World Health Organization (WHO) as “an insufficient physical activity level to meet present physical activity recommendations” (1). Physical inactivity is one of the leading risk factors for non-communicable diseases (NCDs) and mortality worldwide, while regular physical activity can reduce the risk of cancers by 8–28%, heart disease and stroke by 19%, diabetes by 17%, and depression and dementia by 28–32% (2). It is estimated that if physical inactivity levels remain unchanged, there will be 499.2 million new cases of preventable NCDs and mental health conditions globally between 2020 and 2030. The total cost of these preventable conditions is projected to reach US$301.8 billion, averaging around US$27.4 billion per year (3). This makes physical inactivity one of the biggest public health problems of the 21st century (4). For this reason, the WHO aims to achieve a 15% reduction in physical inactivity among adults and adolescents between 2016 and 2030. To achieve this goal, four strategic objectives have been identified: creating active societies, environments, people, and systems (5).

According to the WHO, in 2020, 31% of adults worldwide did not meet the recommended levels of physical activity, which equates to 1.8 billion physically inactive adults (6). Türkiye has the third-highest prevalence of physical inactivity in Europe, with 44.4% of the population being physically inactive. Additionally, while the global gender gap in physical inactivity is around 5%, this disparity is much larger in Türkiye, reaching nearly 20% (53.4% in women compared to 35.2% in men) (7). Türkiye also ranks first in Europe for obesity prevalence, a condition closely linked to physical inactivity, further underscoring the importance of addressing this public health issue (8). The Turkish Ministry of Health, within the scope of the “Action Plan for the Prevention of Adult and Childhood Obesity and Physical Activity 2019-2023,” aims to reduce physical inactivity by 15% by 2030. The plan focuses on providing leadership and coordination, increasing physical activity among children and adolescents, making physical activity a part of adults’ daily lives, and encouraging the elderly to be more physically active (8).

Although similar studies have been conducted globally (3,10,11), Türkiye’s high rates of physical inactivity, along with the notable gender disparity, suggest the need for a more detailed and country-specific evaluation. A study with updated and country-specific data would help to better understand the factors driving these patterns in Türkiye and could inform the development of more appropriate public health interventions tailored to the Turkish context.

The aim of this study is to calculate the proportion of chronic diseases such as coronary heart disease (CHD), type 2 diabetes (DM), stroke, dementia, depression, and hypertension in Türkiye that can be attributed to physical inactivity, using the Population Attributable Fraction (PAF) to estimate the percentage of cases that could potentially be prevented if physical inactivity was eliminated. By estimating the population attributable fractions, we aim to provide data that will inform public health strategies targeting increased physical activity.

Material and Method

This study was designed and conducted as an ecological study. Physical inactivity was defined as not meeting current WHO recommendation (doing at least 150 min of moderate-intensity, or 75 min of vigorous-intensity physical activity per week or any equivalent combination of the two) (1). According to WHO

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Guidelines on Physical Activity and Sedentary Behaviour there is high certainty evidence that any level and any intensity of physical activity is associated with lower incidence of CHD and type 2 DM (1). Also, moderate certainty evidence supports an association between physical activity and improvements in mental health and cognitive health (1). Physical Activity Guidelines Advisory Committee Scientific Report indicates that stroke is less common among individuals who are or become more physically active (12).

Data Sources

Physical activity data based on sex- and age-specific prevalence were obtained from 2017 National Household Health Survey, Prevelance of Non-Communicable Disease Risk Factors (13). Sex and age specific incidence, death and disability-adjusted life year (DALY) data for CHD, stroke, type 2 DM, depression (major depression and dysthymia) and dementia were obtained from the recent Global Burden of Disease study in 2021. In this study, the data was organized into 5-year age groups, and the calculations were performed accordingly (14). For hypertension, incidence data was obtained from the Ministry of Health's report of cohort study conducted in Türkiye (15). The relative risks (RRs) associated with physical inactivity defined for the diseases were retrieved from the recent meta-analyses (16–19).

PAF Calculations

To estimate the attributable burden of diseases associated with physical inactivity, PAFs were calculated using the Levin's equation (20):

$$\text{PAF}=\frac{P\ (RR-1)}{1+P\ (RR-1)}$$

where P is the prevalence for physical inactivity, RR is its corresponding relative risk (RR). Prevalences for physical inactivity were obtained by gender and age group, as reported in the National Household Health Survey, and the PAFs were calculated separately. The number of cases, deaths, and DALY data for NCDs were also organized by the same age groups and genders to calculate the proportions attributable to physical inactivity. All data was stored and analysed using Microsoft Excel 2016 (Microsoft Corporation, USA).

Results

Between 3.1% (for hypertension) and 16.7% (for dementia) of NCD cases examined in this study were attributable to physical inactivity. Following dementia, the highest proportion of cases attributable to physical inactivity was found in

Table 1: Proportion and number of cases, deaths and DALYs attributable to physical inactivity, by type of disease and sex

Parameters	Men		Women		Both	
	PAF (%)	Attributable number	PAF (%)	Attributable number	PAF (%)	Attributable number
Incidences						
CHD	7.2	26,694	11.2	28,259	8.8	54,953
Stroke	7.3	3,352	11.6	5,758	9.5	9,111
Type 2 DM	5.7	9,430	8.6	13,879	7.1	23,309
Hypertension	2.3	21,420	3.6	44,568	3.1	66,007
Depression	8.6	142,273	13.3	406,919	11.6	549,192
Dementia	12.6	5,808	19.3	13,978	16.7	19,787
Mortality						
CHD	7.7	4,758	12.6	6,368	9.9	11,127
Stroke	7.8	2,151	12.6	4,051	10.4	6,202
Type 2 DM	7.0	724	11.2	1,402	9.3	2,127
Hypertension	2.7	1,587	4.6	2,943	3.7	4,531
Dementia	13.0	940	20.0	2,572	17.5	3,513
DALYs						
CHD	7.2	99,581	12.0	99,067	9.0	198,649
Stroke	7.4	43,918	11.9	69,587	9.6	113,506
Type 2 DM	6.0	33,321	9.5	61,676	7.9	94,997
Hypertension	2.6	31,990	4.4	33,998	3.4	49,986
Depression	8.6	22,693	13.3	61,269	11.6	83,962
Dementia	12.8	19,022	19.6	49,880	17.1	68,902

depression (11.6%). PAFs for stroke, CHD and type 2 DM were 9.5%, 8.8% and 7.1% respectively. PAFs were significantly higher for all diseases in women. The high number of depression and dysthymia cases caused by physical inactivity is also noteworthy (Table 1).

Physical inactivity was responsible for 3.7%-17.5% of the deaths and 3.4%-17.1 of the DALYs. An estimated 11,127 deaths and 198,649 DALYs related to CHD could have been prevented by achieving sufficient levels of physical activity (Table 1). For all noncommunicable diseases, 6.0% of deaths (8.3% for women and 4.1% for men) and 3.7% of DALYs (4.5% for women and 2.8% for men) were due to physical inactivity.

With increasing age, the proportion of all NCDs attributable to physical inactivity also increased. In all age groups, PAFs were higher in women than in men (Fig. 1 and 2).

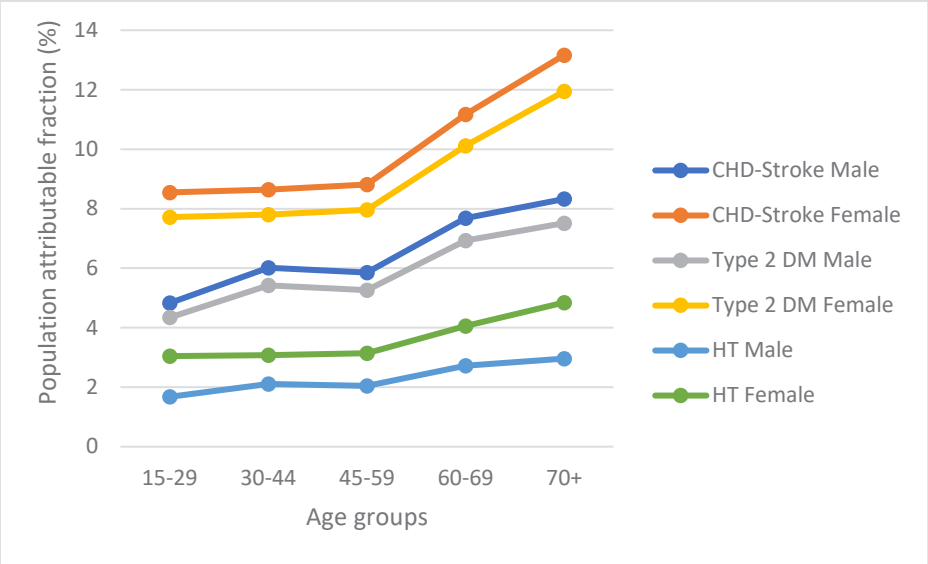

Figure 1: Population attributable fractions of CHD, Stroke, DM and HT by sex and age groups

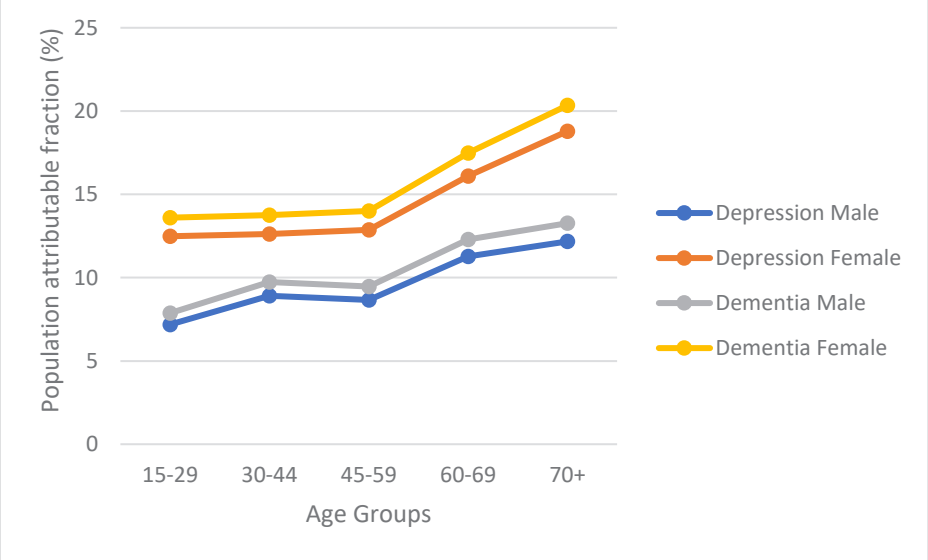

Figure 2: Population attributable fractions of depression and dementia by sex and age groups

Discussion

The results of this study highlight the significant burden of physical inactivity on various chronic diseases in Türkiye. PAFs of physical inactivity are 8.8% for CHD, 9.5% for stroke, 7.1% for type 2 diabetes, 3.1% for hypertension, 11.6% for depression, and 16.7% for dementia. The data also show that physical inactivity plays an important role in both the incidence and mortality of these chronic diseases, with notable contributions to the overall disease burden, as measured by DALYs.

Previous global studies have shown that the PAF of physical inactivity in Türkiye was around 5-5.5% for stroke and CHD, 5% for type 2 diabetes, 8% for depression, 9% for dementia, and 2% for hypertension (3,10). In these studies, it has also been observed that the PAFs for physical inactivity in Türkiye are higher compared to countries with a similar economic level or geographical region (3,10). Additionally, a global study found that the average PAF for physical inactivity in CHD worldwide was 6%, while in Türkiye it was 9.3%. For type 2 DM, the global average PAF was 7%, whereas in Türkiye it was found to be 11.5% (11). Furthermore, a meta-analysis including 22 studies from various countries reported an unweighted PAF for dementia related to physical inactivity ranging from 7.1% to 30.5%, with a pooled estimate of 16.7%, which is identical to the PAF we calculated for Türkiye (21). The PAF for physical inactivity in diabetes has been reported to range from 3% to 39% in different studies (22).

PAF calculations can yield different results depending on the chosen RR, the sources used for prevalence estimates, and the data provided for the incidence of selected diseases. In this study, we aimed to obtain the most accurate PAF estimates for Türkiye by utilizing the most widely accepted and frequently used meta-analyses for RR, and by calculating prevalence for physical inactivity and incidences for non-communicable diseases data separately for age groups and genders based on the most up-to-date and comprehensive national studies. Although PAF estimates vary depending on the study location and methods, it is clear that the PAF of physical inactivity for chronic diseases is notably high in Türkiye. The elevated PAFs for incidence are reflected in similarly significant contributions of physical inactivity to mortality and overall disease burden, as measured by DALYs.

The gender gap in physical inactivity in Türkiye is significantly high, with a difference of 18.2%. This disparity is more comparable to countries like Iran, Iraq, Pakistan, and Afghanistan, rather than European nations (7). As a result, in all the diseases examined, the PAF of physical inactivity is consistently higher among women compared to men. The primary reason for this gender difference in physical inactivity is attributed to higher gender inequality (23). Additionally, in middle- and high-income countries, income inequality has also been shown to contribute to the gender gap in physical inactivity (24) . Despite this, the Ministry of Health's Action Plan contains very limited targets specifically aimed at women (9). To address this inequality, it is important to implement gender-sensitive policy approaches that consider how contextual factors and exercise environments can be adapted to encourage voluntary physical activity among women (25). Such approaches could help reduce the gender disparity in physical inactivity and improve overall public health outcomes.

As stated by the WHO, the prevalence of physical inactivity increases, particularly among those aged 60 and over (6), and this trend is similarly observed in Türkiye. In Türkiye, the already significant gender gap in physical inactivity becomes even more pronounced in the population aged 70 and above. Therefore, the WHO's recommendation to "focus on women and older adults" takes on even greater importance for Türkiye (6). The Turkish Ministry of Health's action plan includes a specific goal to increase physical activity among the elderly (9). It is essential that the actions outlined in this goal are implemented quickly and effectively.

It is important to consider the limitations of our study when interpreting the findings. A key limitation is the reliance on physical activity data, which may not fully capture the complexity of individual behaviors. Additionally, the RRs used in our analysis were derived from international studies and may not fully reflect the specific demographic, genetic, or environmental factors relevant to the Turkish population. The uniform application of RRs across all age groups and both sexes may not account for variations in susceptibility to chronic diseases based on age or gender. Moreover, the lag time between

exposure (physical inactivity) and disease onset was not taken into account, as the data primarily represented recent exposure without adjustment for delayed effects. Lastly, interactions between risk factors such as diet, smoking, and physical inactivity were not considered, potentially leading to an overestimation of some PAFs by assuming independence between these factors.

Despite these limitations, our study possesses several strengths that enhance the reliability and relevance of the findings. First, the analysis is based on prevalence data collected within Türkiye, ensuring that the results reflect the specific characteristics of the Turkish population. Furthermore, the use of the most up-to-date data provides an accurate representation of the current prevalence of physical inactivity and its health consequences. A notable strength is that this study was conducted in a population with one of the highest rates of physical inactivity globally, offering critical insights into the public health implications. Additionally, data were stratified by both gender and age, allowing for a detailed understanding of how physical inactivity impacts different segments of the population.

Conclusions

Physical inactivity represents a significant public health challenge for Türkiye, contributing substantially to the burden of chronic diseases. The marked gender disparity, particularly among women and the elderly, highlights the necessity for targeted interventions. It is imperative that immediate action be taken to reduce physical inactivity, with a particular focus on women and older adults, as highlighted by the WHO. While the Ministry of Health's action plan provides a valuable framework, greater emphasis must be placed on the timely and effective implementation of its recommendations, particularly in relation to the identified key populations.

Future research should focus on addressing identified barriers to physical activity within these groups and evaluating the effectiveness of interventions. By prioritising these recommended actions, it is anticipated that Türkiye can significantly reduce the burden of chronic diseases and enhance the overall health and well-being of its population.

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