

**Research Article**

**A Population-based Study of Prevalence and Trend of Main Risk Factors  
of Non-communicable Diseases in the 15-64 Age Group in  
Kermanshah Province from 2006 to 2009**

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**ABSTRACT**

**Introduction:** Epidemiological studies have indicated that there is a global prevalence of cardiovascular and non-communicable diseases; in addition, the number of people prone to these diseases is also increasing. This study aims to shed light on the trend of risk factors of non-communicable diseases in Kermanshah Province, Iran.

**Methods:** This cross-sectional study uses WHO STEPwise approach to NCD surveillance on the 15-64 age group in 4 phases from 2006 to 2009. Sampling unit of this study consists in clusters of 20 qualified people. Through sampling, 5 age brackets containing similar numbers of males and females entered the study; there placed 4 people in every age bracket (2 males and 2 females). Finally, 2500 people entered this study in each phase (10000 people in 4 period). The data was collected using questionnaires, physical measurements, and blood samples. Then the data a SPSS 16, and the results were presented in frequency tables at 95% confidence interval.

**Results:** In this study, it has been observed that prevalence of low physical activity, overweight, and obesity increased in both genders, while cigarette smoking decreased in both genders. Hypertension in men was on the increase until 2007, but on the decrease afterwards. However, there have not been any changes in female hypertension. Blood data showed that the largest prevalence of high cholesterol was in 45-54 age bracket for both men and women, whereas the highest prevalence of triglyceride was in 35-44 age bracket for men and in 55-64 age bracket for women.

**Conclusion:** This study proved that there is high prevalence of risk factors of non-communicable diseases in Kermanshah Province. As risk factors have cumulative effects on each other, and all of them are related to inappropriate nutrition pattern, there should be an interventionist plan to change the nutrition pattern so that risk factors prevalence, cardiovascular diseases, diabetes, and cancers would decrease in the province.

**Keywords:** Surveillance system, risk factors, non-communicable diseases

**INTRODUCTION**

Communicable diseases used to be the main global cause of death up to last few decades, and life expectancy was low owing to uncontrollable epidemics. After the Second World War, access to drugs, vaccination, antibiotics, and life improvement turned non-communicable diseases

into a major problem in developed countries, and cardiovascular diseases, cancer, diabetes, chronic pulmonary diseases inflicted hefty costs on these countries; afterwards, upon the turn of the 3<sup>rd</sup> millennium, an increasing trend in non-communicable diseases came to existence in

developing countries (1). Currently, 79% of death cases and 85% of disease-based costs are attributed to non-communicable diseases in developing countries. According to estimations, 7 out of every 10 death cases in 2020 in developing countries will be because of non-communicable diseases (2).

Some risk factors of non-communicable diseases such as age, gender, and genetic characteristics are not changeable, but there is too many of them which can be adjusted so as to decrease the incidence of non-communicable diseases (3). WHO introduced 8 risk factors of non-communicable diseases in 2002 report of decreasing risks and improving life. Eventhough many risk factors as hypertension, alcohol, and smoking are widespread in all countries, the main risk factors vary from developed countries populations and developing countries populations (4). Generally, 53% of death cases are in direct relation to lifestyle (5). Many health problems in most countries, especially developing ones, connect with the lifestyles of their people (6). One change in lifestyle has been low exercise and mobility which causes 70% of diseases (7).

Ideal nutrition is vital for health improvement, diseases prevention, and maintain the health after convalescence. Inadequate or excessive intake of nutrients causes malnutrition and develop various diseases (8). In accordance with the annual report of health, 170 million children in poor countries are underweight, 3 million of whom die of this yearly; on the contrary, there are more than 1 billion adults all over the world who are overweight, 300 million of which are considered obesity in clinical terms. It is also calculated that low daily consumption of fruits and vegetables causes 3 million death cases in a year (4). Another change in lifestyle is smoking; based on studies, mortality rate in higher in smokers, their absence from work is 1.5 times non-smokers, and their hospitalization due to diseases is 1.10 times their non-smoking peer group (9).

In last decades, we have observed extensive changes in lifestyle and the shape of different

pathogens and mortality in Iran which van be put down to technology development, enlargement of industrial infrastructures, growth of urbanization, relative control of infectious diseases, decrease in child mortality rate, change in age structure of the population, increase in percentage of senior citizens, rise in life expectancy, and in turn, as a consequence of global and international transformations and changes. Presently, the most common reasons of death are cardiovascular diseases, accidents, and cancers respectively (10 & 11). In Iran, 317 people die of cardiovascular diseases, 103 people die in unintentional accidents, and 98 people die of cancers every day (12). It has been shown that primary preventive actions are 4 times more effective than secondary preventive actions in decreasing death cases of cardiovascular diseases. Heightening awareness of risk factors can pave the way for primary preventive actions (13). Therefore, it is necessary to, first, scientifically recognize main changeable risk factors in the population of interest, and then, via interventionist plans, take crucial steps to overcome this tsunami-like phenomenon and improve the health level of the society.

There exist several studies on recognition of risk factors in different populations of Iran provinces (14 & 15), but there has not, unfortunately, been a comprehensive study on this issue in Kermanshah Province. So, this paper intends to examine the frequency of risk factors of non-communicable diseases, and get to know of its trend from 2006 to 2009 in order to devise some appropriate interventionist plans.

## **MATERIAL AND METHODS**

### **Design of study method**

This cross-sectional study has been conducted in 4 sequential periods in Kermanshah Province from 2006 to 2009. Population of interest included people of 15 to 64 years of age who inhabited in urban and rural areas of Kermanshah Province. This study uses WHO STEPS regarding non-communicable diseases. This approach follows 3 steps in examining the risk factors, First Step:

Questionnaire, Second Step: Physical Measurements, Third Step: Blood Samples for Biochemical Measurements. In this study, the first and second steps were taken in 4 periods, but the third step was used just upon need in 2006. Sampling method in this study was systemic and multi-phase clustered; in all 4 periods, same population and sampling method were used to get the standard data. Sampling unit of this study consists in clusters of 20 qualified people. In this sampling, 5 age brackets, i.e. 15-24, 25-34, 35-44, 45-54, 55-64 years of age, having similar numbers of males and females, were selected to be included into the study. Thus 4 people (2 men and 2 women) were placed in each bracket, which finally, 2500 people entered this study in each phase (10000 people in 4 period). The blood samples of people of 25-64 years of age were available.

#### **Data collection and measurements**

In the first step, Non-communicable Diseases Risk Factors Questionnaire published by WHO came in handy; this questionnaire comprised 2 parts: Part 1 was related to household information, and Part 2 included interactional and behavioral risk factors, collected by trained people who visited every house in person and gathered the information. In second step, some physical examinations like height measurement, weight measurement, and blood pressure measurement were conducted by medical staff. Measurements were all done via standard devices and methods. Weight was measured wearing light clothes and no shoes, and height, via a tape measure, in an upright position, wearing no shoes, and on a smooth surface. Blood pressure of all participants were measured at 3 sittings with 5-minute breaks, using a mercury manometer, applied on the right hand. The third step was collecting the blood samples in order to gauge cholesterol and triglyceride levels, which was done by people referring to clinics.

#### **Definitions**

**Physical activity:** Amount of physical activity was used as the criterion based on the frequency and duration of body exercise in work time,

transportation, free time on a metabolic to minutes (MET-minutes) scale; if exercise is less than 600 MET-minutes per week, it was known as low level. **(Cigarette) Smoker:** A person who smokes at least one cigarette every day is considered a smoker. **Body Mass Index (BMI):** In the current study, overweight and fatness were measured according to BMI: if  $18.5 \leq \text{BMI} \leq 24.9 \text{ kg/m}^2$ , the person is normal; if  $25 \leq \text{BMI} \leq 29.9 \text{ kg/m}^2$ , the person is overweight; and if  $\text{BMI} \geq 30 \text{ kg/m}^2$ , the person is fat. **Blood Pressure:** People who have a systolic blood pressure equal to or over 140 or a diastolic blood pressure equal to or less than 90 mmHg or both, and those who have experience of taking hypertension drugs within 2 recent weeks, are people with hypertension/high blood pressure. **Blood Lipid:** When triglyceride and cholesterol are over 200 mmol/l, that is risky.

#### **Ethics and statistical analysis**

Before conducting this study, all participants gave oral consent to the first and second steps, and written consent to the third step. The data was keyed into SPSS 16, and the results were presented into frequency tables with 95% confidence interval.

#### **RESULTS**

This study showed the following: within these 4 years, the average heights in males are 170.6 cm to 171.6 cm, and in females, 156 cm to 156.8 cm; the average weight in males are 71.1 kg to 72.5 kg, and in females, 63.9 kg to 64.5. In addition, the average cholesterol is 184.2 mmol/l to 177.8 mmol/l, and that of triglyceride is 130.8 to 148.3 mmol/l.

In the current study, prevalence of low physical activity was higher in women than men, and during these 4 years, low physical activity has increased in both genders. Additionally, daily cigarette smoking was lower in women than men and it has a decreasing trend in both genders. The prevalence of overweight was relatively similar in men and women and has undergone a slightly increasing trend for both males and females. Prevalence of obesity is higher in women than

men; it has increased in both genders, but more tangibly in women. Men had higher blood pressure than women; it was on the increase in men until 2007, but then it got on the decrease; there was no change in women blood pressure (Figure 1).

Blood data indicated that the highest prevalence of cholesterol was in both genders in the 45-54 age group, while the highest prevalence of triglyceride in men was in the 35-44 age group, and in women, in the 55-64 age group (Figure 2).

**Figure1:** Prevalence and trend of risk factors of non-communicable diseases in the 15-64 age group in Kermanshah Province from 2006 to 2009 based on gender and year

Variable	Year	Men (prevalence with 95% confidence interval)	Women (prevalence with 95% confidence interval)	Total (prevalence with 95% confidence interval)
Low physical activity	2006	17.3 (13.1-22.6)	51.6 (43.9-59.3)	34.5 (30.2-39)
	2007	18.6 (14.6-23.4)	53.2 (46.6-59.7)	35.7 (31.5-40)
	2008	17.4 (12.7-23.4)	53.2 (44.1-62.1)	35.1 (29.6-41)
	2009	24 (2.8-26.3)	46.3 (42.4-50.2)	35 (30.2-40.1)
Daily Cigarette Smoking	2006	21.3 (17.9-25.3)	1 (0.5-1.9)	11.3 (9.6-13.3)
	2007	25.4 (22.4-30.8)	1.1 (0.6-2)	13.9 (11.8-16.2)
	2008	22.1 (17.5-25.4)	0.9 (0.1-1.7)	11.6 (9.1-13.1)
	2009	18.1 (16-20.4)	0.9 (0.1-1.7)	9.4 (7.6-12)
Overweight	2006	30.3 (25.5-35.5)	32.8 (35.1-48.8)	31.5 (31.8-40.4)
	2007	33 (31.3-43.1)	33 (26.8-35.6)	33 (30.3-38.1)
	2008	34.2 (27.4-37.3)	33 (27.7-38.7)	33.5 (27.5-36.9)
	2009	34.7 (29.5-40.2)	33.3 (25.8-36.1)	34 (28.6-37.1)
obesity	2006	9.8 (7.6-14.3)	16.4 (12.6-20.9)	13.4 (10.7-16.6)
	2007	9.9 (5.2-10.1)	22 (20-28.6)	15.5 (13.3-18.1)
	2008	10 (8.1-13.2)	23.9 (19.1-27.3)	16.6 (14.1-19.4)
	2009	10 (6.6-12.3)	26 (21.3-31)	17.4 (14.5-20.6)
Hypertension	2006	18.7 (14.8-23.3)	13.7 (10.4-17.8)	16.2 (13.5-19.4)
	2007	21 (15.8-27.3)	14.8 (11.7-18.6)	17.9 (14.7-21.6)
	2008	20.1 (14.6-25.3)	13.24 (10.4-17.3)	16.7 (13-21.4)
	2009	19.8 (13.5-25.3)	13.4 (9.8-16.2)	17.6 (14.8-20.3)

Variable	Age	Men (prevalence with 95% confidence interval)	Women (prevalence with 95% confidence interval)	Total (prevalence with 95% confidence interval)
Cholesterol over 200	25-34	15.3 (12.2-19.2)	9.1 (7.7-10.8)	12.3 (10.8-13.9)
	35-44	24.3 (21.8-27.7)	24.7 (22.9-26.6)	24.7 (23-26.4)
	45-54	24.6 (22.1-25.2)	48.3 (46.8-49.7)	26.6 (25.5-27.8)
	55-64	23.4 (22.7-24.6)	45.7 (45-46.5)	34.6 (34.2-35.5)
	25-64	16.9 (12.4-22.6)	16.2 (13.5-19.4)	16.5 (14-19.4)
Triglyceride over 200	25-34	20.5 (17.3-1.24)	10.3 (8.8-12.1)	15.5 (13.8-17.3)
	35-44	32.4 (29.2-35.8)	16.8 (15.3-18.4)	24.8 (23.1-26.5)
	45-54	5.1 (3.7-7)	16.8 (15.8-17.9)	10.9 (10.1-11.7)
	55-64	14.4 (13.6-15.3)	25.3 (24.5-26)	19.9 (19.4-20.5)
	25-64	20.2 (15.3-26.2)	9.6 (6.9-13.2)	13.8 (11-17.2)

**Figure2:** Prevalence of cholesterol and triglyceride in the 25-64 age group in Kermanshah Province from 2006 to 2009 based on age and gender

#### DISCUSSION:

This study showed that the prevalence of physical activity is increasing in Kermanshah Province,

which is in harmony with nationwide studies. Koohpayezadeh indicated that in the entire Iran, the prevalence of low exercise has been on the

increase in both genders, and rose from 15% in 2007 to 21.5% in 2011 (16). Anyhow, aerobic exercise has increased in the USA (17). It can be claimed that in this study, 35% of people in 15-64 age group had low physical activity (less than 600 MET/minute in a week) during 2006 and 2009; in addition, the prevalence of low exercise was more in Hamedan and Kordestan Provinces, and less in Ilam, Lorestan, and Kermanshah Provinces (18 & 19). Najafipour stated that the prevalence of low, average, and high rates physical activity in Iran were respectively 42%, 45%, and 12.4% (20). There are different statistics of physical activity amount in other countries; the lowest amount was in Taiwanese and Saudi Arabian women (2%), and the highest, in Danish women (81%). The lowest amount of physical exercise in males was related to Brazilians (4%), and the highest, the Swedish (77%) (21). Even though these pieces of information can lay the ground for interventionist plans, it should be noted that the remarkable difference between countries, or Iran provinces, can be attributed to the study of various age groups and many different definitions of physical activity.

Of other factors play a main role in the increase of non-communicable diseases in the increase in BMI. BMI is on an annual increase in Qom Province. The study on Tehrani adults showed that there does exist an upward trend in BMI (22). This trend can be seen in both American males and females, more tangibly in females (23). Janghorbani showed that the prevalence of overweight or obesity ( $BMI \geq 25$ ) in the entire Iran consists in 42% in men and 57% in women (24). According to the nationwide study, Kermanshah Province comes after Mazandaran, Qom, Western Azerbaijan, and Ardebil Provinces in terms of most people with overweight and obesity (19). This rise could stem from nutrition/eating style, decrease in exercise and mobility, change in lifestyle, and lack of adequate awareness of dangers of obesity. The studies carried out in Lar and Bam showed that respectively 78.9% and 52% of their inhabitants

do not have enough information about the dangers of fatness (25 & 26).

In the current study, the prevalence of high blood pressure in men is more than women and its rate was on the decrease from 2008 onwards. In a similar vein, a study in the USA on adolescents of 12-19 years of age showed that the prevalence of HBP was decreasing while pre-HBP did not undergo any changes (27). xi B showed that the prevalence rates of HBP in children and teenagers which were respectively 2.8% and 1.3% in 1999-2002 and 2009-2012 time periods, had a downward trend (28). On the other hand, the nationwide study of risk factors of non-communicable diseases showed that the average blood pressure is higher in Kermanshah Province than the average of the whole country (19). It seems that the reason for these changes are the heightening of people's awareness of this disease and more control over it, but there is a high percentage of people with high blood pressure, needing careful attention and regular supervision of the patients.

Many studies proved that smoking is a major risk factor; this study showed a decreasing trend in smoking. Mohammad et al. indicated that in Iran, we can observe a downward trend of cigarette smoking in 15-65 age group (29). There has also been a decreasing trend in the USA: 20% down in men and 23% in women (30). Despite this decrease, Kermanshah Province is the 2<sup>nd</sup> province, next to Khuzestan Province, with high cigarette smoking (17.4 cigarette smoked daily) in people studied, according to the report of State Surveillance System of Non-communicable Diseases. This report also showed that the highest number of smoked cigarettes was related to men of 25-34 years of age in Kermanshah Province (31). This information signifies that though there has been a downward trend of smoking in the Province, it is more than the whole country's average and needs special attention.

The prevalence of high cholesterol and triglyceride was 16.5% and 13.8%. The study by Nematipour in Tehran Province showed that in

28.2% of people, cholesterol was equal to or more than 240 mg/dl, and in 31.2%, it was between 200 and 239 mg/dl (32). The 2015 Meta-analysis indicated that the prevalence of cholesterol over 200 in Iran is 38% (33). In Rafsanjan, 26.6% of people had high cholesterol and 5.7% had high triglyceride. This study claimed that there is a significant, positive relationship between the complete level of cholesterol and triglyceride, viz. these figures go up as age goes up ( $p=0.001$ ) (34).

### CONCLUSION:

It became clear in this study that there is a high prevalence of risk factors of non-communicable disease in Kermanshah Province. Considering these factors have cumulative effects on one another, and as almost all of them are related to inappropriate nutrition style, therefore, we should try to change eating habits in the Province via careful designing of interventionist policies, so the prevalence of risk factors and cardiovascular diseases, diabetes, , and cancers would go down.

### ACKNOWLEDGEMENTS:

We would like to extend our debt of gratitude to our colleagues in faculty of health for their hard work during 4 yours, and also to Research and Technology faculty of Kermanshah University of Medical Sciences for their financial support.

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