

## Original Research Article

# A cross-sectional survey of Indians in Kuwait with risk factors for coronary artery disease

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## ABSTRACT

**Background:** The Indian sub-population is the biggest among the foreigners in Kuwait. Due to the harsh weather conditions most of the time in the year there is less inclination towards a healthy lifestyle. The present study was conducted to determine the extent of the Indian population living in Kuwait having the risk factors for coronary artery disease (CAD).

**Methods:** A cross-sectional survey was conducted including 400 subjects aged 18 years or more (346 males and 54 females). They were subjected to general physical examination, and were asked to respond to a standard questionnaire.

**Results:** Significantly more females than males were found to be overweight (63% vs. 43.9%,  $p < 0.01$ ) or obese (16.7% vs. 4.3%,  $p < 0.005$ ). Females also had higher proportions than males in having inadequate physical activity (79.6% vs. 53.2%,  $p < 0.001$ ). Significantly more males were having an inadequate intake of fruits and vegetables as compared to females (34.7% vs. 18.5%,  $p < 0.005$ ). There was no significant difference between the genders in proportions of hypertension, smoking, and diabetes. Overweight, hypertension, and inadequate physical activity showed a rising trend with increasing age. The studied population was compared with several geographically different populations, as well as the different populations living in India.

**Conclusions:** As the stay and the jobs of Indians in Kuwait depend upon their health-status, prevention of CAD is of paramount importance. Looking at the levels of the prevalence of several risk factors, multilevel interventions are needed for reducing the CAD-morbidity and mortality.

**Keywords:** Indians in Kuwait, Risk factors, Coronary artery disease

## INTRODUCTION

Cardiovascular disease (CVD) is the leading cause of death and disability worldwide. The World Health Organization (WHO) estimated in 2008, globally 7.3 million deaths were due to coronary artery disease (CAD). The developing nations are projected to be bearing 85% of the global burden of CAD by 2020.<sup>1</sup> According to the Interheart and Interstroke studies,

smoking, hypertension, diabetes, lack of physical activity, poor diet are the most common risk factors for CAD worldwide.<sup>2,3</sup>

Worldwide, the burden on public health is now largely due to the non-communicable diseases (NCDs) instead of the earlier predominant communicable, perinatal, neonatal, and nutritional causes of morbidity. The NCDs occur mainly due to sedentary lifestyle, types of food consumed including more consumption of salts, sugar,

saturated fats, and trans fats, and are the reason of two-third of total morbidity-burden in India.<sup>4</sup> To address this, the WHO has set its 25×25 target, which is to reduce the premature mortality due to NCDs by 25% by the year 2025.<sup>5</sup> To achieve this the WHO has formulated an NCD Global Monitoring Framework (NCD-GMF), in which it has put up a comprehensive plan to reduce the various risk factors like tobacco use by 30%, harmful alcohol use by 10%, salt intake by 30%, prevalence of hypertension by 25%, and to promote physical activity.<sup>6</sup> The goal 3, target 4 of the United Nation (UN)'s sustainable development goals (SDGs) aims for a 33% reduction of NCD mortality by the year 2030.<sup>7</sup>

Kuwait is affected by this global burden of NCDs too. The population of Kuwait is 4.1 million; out of which 8,25,000 are Indians, the maximum among the expatriate population of Kuwait. Harsh weather conditions and long working hours of the foreign work force are the main deterrents in pursuing a healthy lifestyle in Kuwait. In Kuwait, the major Indian population is of working age-group. This so-called non-resident Indian (NRI) population is away from the preventive healthcare network of its native country. Kuwait, as a policy does not provide a permanent residency status or citizenship to the expatriates. Hence they have to return back to their respective countries after retirement. This returning population with an advanced age increases the healthcare burden on the home country. There are scarce data on the lifestyle and health of the Indian community living in Kuwait.

The prevalence of risk factors in a population determines the future burden on healthcare services and the loss of individual's productive years. The aim of this study was to know the prevalence of different risk factors for CAD among the adult Indians living in Kuwait.

## METHODS

**Study design:** The study was a descriptive cross sectional survey.

**Study place and period:** The study was conducted in Kuwait, from October 2017-March 2018.

**Selection criteria of the patients:** The study was conducted on the attendees of the different free health camps organized by the Indian doctors' forum of Kuwait, a registered organization. A total of 400 Indians who were 18 years or more in age, living in Kuwait for more than one year were included in the study. Exclusion criteria included nationality other than Indian, age less than 18 years, and those living for less than one year in Kuwait.

**Procedure:** The data were collected using 'convenient sampling' method. Each visitor of the camp was first registered with his/her name, age, gender, Kuwait's civil identification number, and the chief complaint(s). The

height, weight, temperature (if required), pulse, blood pressure, and blood glucose were checked and recorded. Then he/she was handed over the questionnaire and was directed towards the seat of the appropriate specialist. The questionnaire was based on the Modified WHO steps (Annexure 1).<sup>8</sup> The questionnaire was in English, and included 21 questions. The volunteers provided the translation service for those who required it.

The various risk factors for the CAD were considered on the basis of previously published definitions of various risk factors by the American heart association (AHA).<sup>9</sup> The definitions used are as under:

Hypertension was defined as a systolic blood pressure (BP)  $\geq 140$  mmHg and/or diastolic BP  $\geq 90$  mmHg during the visit; considered known if the subject was told twice by a physician about his/her condition, or was on anti-hypertensive drug treatment.

Diabetes mellitus was considered when fasting serum glucose was  $\geq 126$  mg/dl ( $\geq 7$  mmol/L), and/or postprandial serum glucose  $\geq 200$  mg/dl ( $\geq 11.1$  mmol/L), HbA1c  $\geq 6.5\%$ , or if the subject was aware of this condition or was on anti-diabetic drug treatment.

Overweight and obesity were defined as body mass index (BMI) of  $\geq 25$  to  $\leq 29.9$  kg/m<sup>2</sup>, and  $\geq 30$  kg/m<sup>2</sup>, respectively.

Male sex, age  $>45$  years in males and  $>55$  in females are also counted as risk factors for CAD.

People who smoked or have been smoking within one year of the study were counted as having the CAD risk factor of smoking.

Inadequate intake of fruits/vegetables was defined as an intake of these for less than five times a week.

Inadequate physical activities was defined as noncompliance with at least 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity aerobic activity (or an equivalent combination) per week and perform muscle strengthening activities at least 2 days per week.

### *Ethical approval*

Ethical Approval was taken from ethical committee of Maulana Azad University, Head of Department of Public Health. Informed consent was taken from all the participants before initiating the study.

### *Statistical analysis*

The data were analyzed using MS Excel2007, and Chi-Square test for comparing the categorical data. A p value of  $\leq 0.05$  was considered to be statistically significant.

## RESULTS

Table 1 shows that the largest proportion of the total 400 subjects were having lack of physical activity (56.7%), followed by those with an overweight body (46.5%). It also gives an overview of prevalence of all the risk factors studied with their gender-distribution. Although the number of females was quite low (54), they were

having significantly higher proportions of subjects with overweight, obesity, and physical inactivity ( $p < 0.01$ ,  $< 0.005$ ,  $< 0.001$ , respectively). The males had a higher prevalence of inadequate intake of fruits and vegetables ( $p < 0.005$ ). However no statistically significant difference was found between both the sexes for diabetes, smoking and hypertension.

**Table 1: Prevalence of different risk factors and their gender-wise distribution.**

Risk factors	Number (%) (n= 400)	Sex		P value (males vs. females)
		Males (n=346)	Females (n=54)	
<b>BMI-overweight (kg/m<sup>2</sup>)</b>	186 (46.5)	152 (43.9)	34 (63.0)	<0.01
<b>BMI-obese (kg/m<sup>2</sup>)</b>	24 (6)	15 (4.3)	9 (16.7)	<0.005
<b>Hypertension</b>	108 (27)	94 (27.2)	14 (25.9)	>0.75
<b>Smoking</b>	34 (8.5)	34 (9.8)	0	>0.1
<b>Inadequate intake of fruits/vegetables</b>	130 (32.5)	120 (34.7)	10 (18.5)	<0.005
<b>Inadequate physical activity</b>	227 (56.7)	184 (53.2)	43 (79.6)	<0.001
<b>Diabetes mellitus</b>	82 (20.5)	75 (21.7)	7 (13.0)	>0.1

**Table 2: Age-group-wise distribution of risk factors (n=400).**

Age groups (years)	Total no. (%)	Overweight (%)	Obese (%)	Hypertension (%)	Smoking (%)	Inadequate fruit/vegetable-intake (%)	Physical inactivity (%)	Diabetes (%)
<b>20-30</b>	71 (17.7)	20 (28.2)	0	4 (5.6)	7 (9.8)	16 (22.5)	33 (46.5)	2 (2.8)
<b>31-40</b>	141 (35.2)	80 (56.7)	9 (6.4)	40 (28.3)	11 (7.8)	45 (31.9)	90 (63.8)	20 (14.2)
<b>41-50</b>	133 (33.2)	68 (51.1)	11 (8.3)	42 (31.6)	12 (9.0)	49 (36.8)	80 (60.1)	35 (26.3)
<b>51-60</b>	51 (12.7)	16 (31.4)	4 (7.8)	18 (35.3)	4 (7.8)	18 (35.3)	21 (41.2)	22 (43.1)
<b>61-70</b>	4 (1.0)	2 (50.0)	0	4 (100)	0	2 (50.0)	3 (75.0)	3 (75.0)
<b>Total</b>	400	186 (46.5)	24 (6)	112 (28)	34 (8.5)	130 (32.5)	227 (56.8)	82 (20.5)

**Table 3: Comparison with the parameters from the Indian and non-Indian cohorts of CLARIFY registry.<sup>14</sup>**

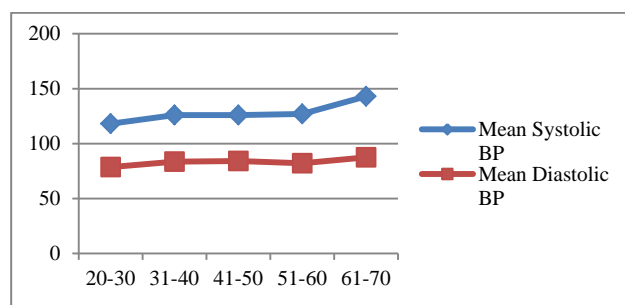
Study parameter	Present study (N=400)	CLARIFY registry (Indians) (N=709)	CLARIFY registry (rest of the world) (N=31994)
<b>Males (%)</b>	346 (86.5)	564 (79.5)	24801 (77.5)
<b>Age (years), mean (SD)</b>	39.9 (8.96)	59.6 (10.9)	64.3 (10.4)
<b>BMI (kg/m<sup>2</sup>), mean (SD)</b>	25.2 (2.76)	25.7 (4)	27.9 (4.6)
<b>Current smoking (%)</b>	34 (8.5)	62 (8.7)	4015 (12.6)
<b>Inadequate physical activity (%)</b>	227 (56.7)	449 (63.3)	16361 (51.2)
<b>Hypertension (%)</b>	108 (27)	493 (69.5)	22717 (71)
<b>Systolic BP (mmHg), mean (SD)</b>	125 (15.66)	131.6 (18.6)	131 (16.6)
<b>Diastolic BP (mmHg), mean (SD)</b>	83.3 (12)	80.8 (9.3)	77.2 (10)
<b>Diabetes (%)</b>	82 (20.5)	304 (42.9)	9198 (28.8)

Table 2 depicts the age-group-wise distribution of the various risk-factors. The age groups 31-40 and 41-50 years comprised of 68.4% of all hypertensives. Of the total 186 overweight subjects, the age group with the highest proportion of overweight persons was 31-40 years (56.7%), followed closely by 41-50 years (51.1%). All of the 24 obese subjects were belonging in the age-brackets of 31-60 years. Hypertension showed a rising trend with the increasing age. On stratifying hypertension into mean systolic and diastolic BP, the same trend was

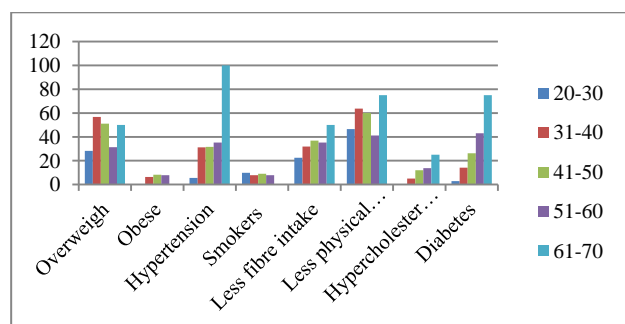
seen (Figure 1). The 34 smokers (8.5%) were distributed equally across all the age groups. All gave the history of smoking cigarettes, no other form of smoking or tobacco usage. The eldest age group had only four subjects so cannot be commented upon. One hundred and thirty subjects (35%) were not eating the fruits/vegetables according to the specified criteria. Like the smokers these were also distributed equally across all the age groups. A total of 227 (56.7%) were leading a physically lesser active life, falling into the cardiovascular risk category.

The trend was just like that of overweight, increasing with age, barring the 51-60 years' age group, which had lesser number of subjects.

The 82 diabetics (20.5%) showed a rising trend with age. Featuring of the two diabetics in the younger age group of 20-30 years (2.8%) is an alarming sign.



**Figure 1: Mean systolic and diastolic blood pressure in different age groups.**



**Figure 3: Age group-wise proportions of different risk-factors.**

Figure 2 gives an overview of the different risk factors in all the age groups.

## DISCUSSION

The present study is a cross sectional survey of the risk factors for CAD among the adult Indians living in Kuwait. The surveyed population included the persons attending the health camps. A total of 400 persons were surveyed, of which 346 were males and 54 were females. The risk factors studied were overweight, obesity hypertension, smoking, inadequate intake of fruits and vegetables, inadequate physical activity, and diabetes mellitus. Some risk factors like blood cholesterol level were not included because of contradictory reports about its role showing paradoxical results among the Indian population.<sup>10</sup>

While the females were in significant higher proportions as compared to males in being overweight, obese and having inadequate physical activity, a bigger proportion of males were having inadequate intake of fruits and vegetables. In the present study the number of females

attending the health camps was almost one-sixth of the males. This is in stark contrast to a Nigerian study in which female attendees of healthcare activities outnumbered the male counterparts.<sup>11</sup> Similar to the present study it reported a higher proportion of females having obesity, while male had higher prevalence of hypertension and diabetes. The present study showed the similar trend for the latter two, however the difference was not statistically significant. Another observation made by the Nigerian study was an increasing prevalence of obesity and hypertension with age, peaking in 54-64 years age group. In the present study the hypertension showed a similar trend but not obesity, which had no statistically significant difference in the same age groups. The difference may be due to the difference in the type of study population in both the studies.

Worldwide, tobacco smoking (including second-hand smoke) was one of the top three leading risk factors for disease and contributed to an estimated 6.2 million deaths in 2010.<sup>9</sup> In the present study there was no difference among the different age groups in the prevalence of smoking. At 9.8% in the youngest age group of 20-30 years it was almost half of that in the corresponding American population (18.5%).<sup>9</sup> Overall, more than one-third of adults in India (35%) use tobacco, with prevalence rates varying from 9% in Goa to 67% in the north-eastern state of Mizoram.<sup>12</sup> The Indians in Kuwait also showed the similar levels of smoking (34%).

The USA national data showed that 30.4% of the people did not engage in physical activity in leisure time. Among the adults more females were physically inactive than males (31.7% vs. 29.9%, respectively).<sup>9</sup> In the present study 56.7% showed the inadequate physical activity, which is quite alarming. Like the USA study our study also depicted a significantly higher number of females being inadequately physically active (79.6% vs 53.2%;  $p < 0.001$ , Table 1). This proportion increases manifolds when the inadequate physical activity is combined with other risk factors like overweight and obesity, which are more amongst them than in males (Table 1).

A large cross-sectional survey, the Indian council of medical research-India diabetes (ICMRINDIAB) study presented data from 3 different states of India.<sup>13</sup> It assessed physical activity using the global physical activity questionnaire in 14,227 individuals aged  $\geq 20$  years. Half of the study subjects were considered physically inactive. These data are comparable with the data obtained in the present study from Kuwait in which a representative sample of Indians was studied. A large study conducted in the industrial setting in India showed an inverse relationship of leisure time physical activity with the educational status.<sup>14</sup> This population could be demographically comparable with the population studied in the present study in Kuwait, linking a lower educational status with the higher level of physical inactivity, as most of the attendees of these health camps are from the down-trodden classes. However it needs

verification with further study using specific questions about the individuals' educational status.

Like in the present study the USA population also showed a trend of reducing physical activity with age (Table 2).<sup>9</sup> In an Indian study conducted in the state of Punjab 41.3% were found to be leading a sedentary lifestyle. The population studied in the Indian study was a rural population hence physically more active than the Kuwaiti Indian population in which (43.3%). Our data are comparable with another Indian study conducted in the eastern state of West Bengal in which 58.7% participants were found to be engaged in sedentary work including 60.7% males and 56% females.<sup>15</sup>

The national family health survey-3 (NFHS-3), a large nationally representative cross-sectional survey covering 156,316 individuals in India with self-reported data on consumption of fruit and vegetables, reported that half of the population consumed zero or only one serving of fruit in a week.<sup>16</sup> The present study saw that one third of the study population was consuming the inadequate amount of fruits and vegetables. Significantly more males were having an inadequate intake. The reason of this difference may be economical, social or a combination of both. On enquiring, the main reason which came out was that most of the people belonged to labor class and were living in the labor camps where the food was prepared and provided by their employer companies with no control of the persons on the menu. Other reasons included cost and ignorance.

The 37.7% of the US adults were obese. In the Indian population survey this proportion was only 6%. This big difference could be due to the difference in the population studied. The type of population attending the health camps included in this study mainly comprises of those doing manual jobs, belonging to lower economic strata.<sup>9</sup>

In the present study females were in statistically significant higher proportions than males in the obesity bracket, like in a US study.<sup>9</sup> But in contrast to the present study the males outnumbered the females in the US study in overweight category. The combined proportion of overweight and obese subjects was 52.5% in our study, another alarming sign. Both increased with age, however the 51-60 years' age-group had a surprising dip in the prevalence of overweight, which may be due to the less number of subjects.

The age-adjusted prevalence of hypertension among US adults  $\geq 20$  years of age was estimated to be 34.0% in 2011 to 2014 (34.5% for males and 33.4% for females). It showed the prevalence of hypertension as 11.6%, 37.3%, and 67.2% among the 20-30, 40-59, and  $\geq 60$  years age groups, respectively.<sup>9</sup> Both, the age and gender trends were similar to the Kuwait study. Like the Indians in Kuwait, a study from rural India showed the prevalence of hypertension as 26.5%.<sup>17</sup>

Prevalence of diabetes in the US was reported to be 9.9% (males 13.6%, females 11.2%).<sup>9</sup> On the other hand, the Indian subjects in the Kuwait study showed the overall prevalence of diabetes as 20.5% (males 21.7%, females 13%,  $p < 0.1$ ), which is much higher than in the affluent country like USA. In a recently published study from India, the prevalence of diabetes has increased to 9.7% from the past 4.7% in 1994.<sup>17</sup> This was similar to the US population. But in comparison, the Indian population in Kuwait showed a dangerously higher prevalence of 20.5%. This could be attributed to the more sedentary life style and dietary habits in Kuwait.

Several surveys in India have observed that CAD is no more a disease of the rich, rather it affects those in the lower socioeconomic, occupational, and educational status more. Persons belonging to these strata of society show clustering of  $\geq 3$  CAD risk factors.<sup>18</sup>

Kaul et al compared the prevalence of various CAD risk factors in the Indian cohort with those in the rest of the world, taken from a big study named 'prospective observational longitudinal registry of patients with stable coronary artery disease (CLARIFY) registry'.<sup>19</sup> It was carried out across 45 geographical regions of the world. In a bird's eye view it seems the Indian population in Kuwait was younger than the other two, less sedentary, less hypertensive, and less diabetic. This can be explained on the basis of them being younger with more males. The comparison between the three populations is shown in Table 3.

One limitation of the study included the lower female population. This prohibited many more detailed sex-wise comparisons. Another limitation of the study was that the design of the study was cross-sectional which provided the information at one point of time. This type of design is unable to attribute causality. But seeing the fact that the population of the study has never been surveyed in the past for the CAD, this is a pioneer study which may form a basis of further more detailed and bigger prospective studies to formulate the preventive and management plans.

## CONCLUSION

The Indians in Kuwait form a special type of population which is a mixture of urban and rural origins, and of different cultures. The conclusion from the present study which may be drawn out is that the Indian females in the Kuwait were more overweight and obese compared to their male counterparts which may be correlated with their significantly less physical activity than males.

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