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# PREVALENCE AND FACTORS ASSOCIATED WITH ELEVATED BLOOD PRESSURE AMONG CAR FREE DAY SPORTS PARTICIPANTS IN THE CITY OF KIGALI, RWANDA

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 **Abstract**

**Introduction:** Elevated blood pressure represents one of the world's most serious public health concerns and its prevalence is rapidly rising in developing countries. Studies done in different EAC country members on hypertension showed steadily increasing with current prevalence of 25.4 per cent, 25.7 percent, 15.3 percent, in Kenya, Tanzania and Rwanda respectively. In an effort to Prevent or control the elevated Blood Pressure, the Government of Rwanda introduced the car free day sports with the aim of preventing or controlling the status of blood pressure. However, even if those measures have been taken, most people remain unaware of their blood pressure status. Therefore, this study aims to determine the prevalence and the factors associated with elevated blood pressure among car free day sports participants.

**Methods**: Cross-sectional research design with quantitative approach was used to collect data from a target population of all car free day sports participants aged above 18 years in the City of Kigali. A descriptive statistic (mean, percentage and frequencies), bivariate (Chi-square test with $\alpha$=0.05) and multiple logistic regression (95% CI and AOR) were carried out to assess the significant factors using statistical packages for social sciences (SPSS v22.0). The significance level was set at P-value equal to ≤0.05 and confidence level of 95%. This study involved 375 car free day sports participants as a total sample size recruited by using random sampling technique in gathering points for car free day in the City of Kigali on one day from sports gathering centers of ULK, RRA and IPRC-Kicukiro.

 **Results**: The study findings on the prevalence of elevated blood pressure among car free day sports participants in Kigali-city demonstrated that 66.4% of the respondents had normal blood pressure; 21.3% had elevated blood pressure; 8.6% had pre-hypertension while 3.7% had hypertension. Multivariate analysis showed that participants aged more than 50 years old were ten times more likely to be associated with elevated BP. Also, being rich was seven times more likely than being poor associated to elevated BP. Also, working as white collar was 7.8 more less likely than working as blue collar associated to elevated BP. Having a family member with hypertension problems was 22.185 times more likely associated to elevated BP. Being a regular alcohol consumer was 12.5 times more likely associated to elevated BP. Not consuming fruit and vegetables was 9 times more likely associated to elevated BP. Not practicing physical exercises was 13 times more likely associated to elevated BP. Smoking was 8 times more likely associated to elevated BP. Having ≥30 of BMI was 7 times more likely associated to elevated BP and having a waist to HIP ratio of ≥0.86 for Male and >1.0 for Female was 7.5 times more likely associated to elevated BP.

**Conclusion:** Therefore, this study revealed that about one third of car free day sports participants in Kigali-city live with elevated blood pressure. In addition, aging, Family history of hypertension, diabetes mellitus and CVD, Alcohol consumption, Smoking, High salted foods consumption are positively associated to the presence of elevated blood pressure (Risk factors) while Physical Exercises, Fruit and vegetable consumption are negatively associated to the presence of elevated blood pressure (Protective factors).

**Key words:** Prevalence, Car free day sports, Elevated blood pressure, Hypertension, Non-communicable diseases, Cardiovascular diseases and Factors associated.

## Introduction

Elevated blood pressure (BP) represents one of the world's most serious public health concerns and its prevalence is rapidly rising in developing countries (WHO, 2022). It is crucial to note that rising blood pressure has a direct impact on more severe disorders such as strokes, diabetes, heart diseases and renal impairment (WHO, 2022). Elevated blood pressure refers to persisting medical disorder that results in fixed elevated BP and is the common cardio-related problem affecting almost one billion people throughout the world and continues to be the leading single public health problem contributing to global burden of disease (WHO, 2022).

Global estimate of hypertension is around 26% worldwide and the occurrence is expected to increase to 29 percent by 2025 (Whelton, 2017). Regionally, in Asia, particularly India, prevalence of BP is alarming and this problem is related to 10.8% of all the deaths in Asia and the overall precursor is the limited knowledge and lack of appropriate preventive information on risks and causes of Hypertension. Most of people do not know their blood pressure status, and in most cases, information on death related to hypertension remains hard to define due to hidden and invisible signs and symptoms of hypertension. Also, most of suspected hypertensive patients appear normal when diagnosed while they are under BP attack (Soumitra, 2019).

In the context of Africa, data from WHO indicates that more than 162.3 million people were diagnosed with hypertension in 2022 and expected to reach 216·8 million by the year 2030 (WHO, 2022). Furthermore, high prevalence of hypertension has adverse effects, such as an elevated risk of cardiovascular disease-related morbidity and mortality (myocardial infraction, stroke) and a hypertensive heart disease (Peltzer et al, 2013).

Studies done in different EAC country members on hypertension showed steadily increasing with current prevalence of 25.4 percent, 25.7 percent, 15.3 percent, in Kenya, Tanzania and Rwanda respectively (Gatimu et al, 2020), (Khamis et al, 2020).

Currently, statistical trends on hypertension in Rwanda tends to suggest gradual increase with the prevalence of 13.7 percent in 2018 to 15.3 percent in 2022 countrywide, the City of Kigali being characterized with high prevalence compared to the remaining part of the country with the prevalence of 19.7 percent alone (MOH, 2022). Couple of quantitative studies insisted on factors including Knowledge gaps, BMI, history of smoking and alcohol, low physical activities, high fasting blood glucose and some medications to be contributing factors to development of hypertension (Gatimu et al, 2020), (Khamis et al, 2020), (Nahimana et al, 2018). In an effort to Prevent or control the NCDs among which there are Cardiovascular Diseases (CVDs), Hypertension (HTN) and elevated Blood Pressure (BP), the Government of Rwanda through its Ministry of Health (MOH) introduced the car free day sports with the aim of preventing or controlling the above condition since 2016. Regarding efforts that have been in place for 7 years now to fight against those NCDs especially elevated blood pressure, most people remain unaware of their BP status. On this issue, the Rwanda Biomedical center (RBC) (2021) estimates that 56% of the population do not know their blood pressure status. The gap in this study is the ignorance of blood pressure status among the majority of the population in Rwanda.

**Materials and methods**

**Research Setting**

The study was conducted in the City of Kigali, at the gathering points for car free day sports participants. These points include Rwanda revenue (Kimihurura), IPRC-Kicukiro and Kigali independents university (ULK).

**Research Design**

The researcher used a cross-sectional research design and adopted a quantitative research approach. So, researcher chose cross-sectional study design because main objective of the study was to determine the prevalence and factors associated with elevated blood pressure among car free day sports participants.

Concerning the population of the study, according to the estimates of the City of Kigali, 6012 adults aged above 18 years old including women and men participated in Kigali car free zone sports in 2022 (City of Kigali, 2022).

**Sample size and sampling technique**

Using cross sectional study, random sampling technique were used to select participants of the study among car free day sports participants who attended who gathered at selected three car free day gathering points s depending on the attendance and those who fit with the inclusion criteria on one day car free day sports gathering of 21st May 2023.

The Sample size was deivered from population of 6,012 participants respondents and was calculated by using Yamane's formula at a confidence interval of 95% and margin of error of 5% as described below where:

n= $\frac{N}{1+Ne^2}$

If

With N= Population = 6,012 and e= Margin error /error of tolerance = (0.05)

n= $\frac{6012}{1+6012(0.05)^2}$ = 375 participants

Therefore, the sample is composed by 375 adult persons participating in car free zone sports in the City of Kigali.

**Data Collection instrument**

Data was directly collected from the selected respondents using a questionnaire. The English to Kinyarwanda pre-translated questionnaires were prepared in advance to allow clear explanation and participant selection.

It helped in assessing the Prevalence and factors associated with elevated blood pressure among car free day sports participants in the City of Kigali, Rwanda. Only closed questions were structured concerning objectives of this study. Therefore, 375 questionnaires were distributed to car free day sports participants aged above 18 years.

## Data Analysis

The data coding was processed to categorize the characteristics of the participants and their blood pressure status and then collected data were entered into Statistical Package for Social Sciences (SPSS) version 22.0 for being analyzed. Data cleaning and were done then descriptive analysis (frequencies, mean and percentage) was done for all independent variables. Chi square test with α =0.05 (bivariate analysis) was done to assess association of independent variable and dependent variable and significant variables in bivariate analysis were further subjected to multivariate binary logistic regression analysis (adjusted odd ratios, 95% CI and P value ≤0.05) were done to measure strength of association between independent variables and outcome variable. Results were presented using tables and graphs.

## Ethical Consideration

Mount Kenya University provided introduction letter to conduct research among car free day sports participants in the city of Kigali, Rwanda. Researcher submitted research introduction letter to the Kigali city administration. Kigali city administration provided approval letter of conducting research in Kigali city car free day sports gathering points, namely Rwanda Revenue Authority (Kimihurura), IPRC-Kicukiro and Kigali Independent University (ULK). Data collectors ensured that all participants were explained objectives of the study and its implication and accepted voluntarily to participate and signed informed consent. Names of respondents were not written to questionnaires to keep identity confidential.

## Results

### Socio-demographic Characteristics of Respondents

As shown in Table 1 below, male represented 56% and female were 44% of the participants. The group of more than 50 years old dominated other groups with 38.4%. About 47.7% of the participants were married. The participants who have done secondary school dominated other groups with 38.7%. The majority of the respondents were people of middle class in terms of wealth index with 63.5%. The participants of the catholic religion dominated other sects with 40.3% and the participants considered as blue collar represented 52% while white collar represented 48% of the participants.

**Table 1: Socio-demographic Characteristics of the Respondents**

| Variables | Frequency | Percentage |
|---|---|---|
| **Sex** | | |
| Male | 210 | 56.0 |
| Female | 165 | 44.0 |
| **Total** | **375** | |
| **Age** | | |
| Less than 40 years | 99 | 26.4 |
| 40-50 | 132 | 35.2 |
| More than 50 | 144 | 38.4 |
| **Total** | **375** | |
| **Marital Status** | | |
| Single | 108 | 28.8 |
| Married | 179 | 47.7 |
| Divorced/widower | 88 | 23.5 |
| **Total** | **375** | |
| **Education level** | | |
| Not educated | 44 | 11.7 |
| Primary | 126 | 33.6 |
| Secondary | 145 | 38.7 |
| University | 60 | 16.0 |
| **Total** | **375** | |
| **Wealth index** | | |
| Poor | 41 | 10.9 |
| Middle | 238 | 63.5 |
| Rich | 96 | 25.6 |
| **Total** | **375** | |
| **Religion** | | |
| Catholic | 151 | 40.3 |
| Protestant | 120 | 32.0 |
| Muslim | 58 | 15.5 |
| No religion | 46 | 12.3 |
| **Total** | **375** | |
| **Occupation** | | |
| Blue collar (Workforce) | 195 | 52.0 |
| White collar (Non workforce) | 180 | 48.0 |
| **Total** | **375** | |

Source: Primary data, 2023

**Medico-surgical history of car free day sports participants in Kigali-city**

Table 2 demonstrated that 55.7% of the respondents have members of their respective family who have hypertension problems; about 54.7% of the respondents have members of their respective family who have diabetes mellitus problems and 55.7% of the respondents have members of their respective family who have CVD problems.

**Table 2 Medico-surgical history of car free day sports participants in Kigali-city**

| Variables | Frequency | Percentage |
|---|---|---|
| **Family history of hypertension** | | |
| Yes | 209 | 55.7 |
| No | 166 | 44.3 |
| **Total** | **375** | |
| **Family history of diabetes mellitus** | | |
| Yes | 205 | 54.7 |
| No | 170 | 45.3 |
| **Total** | **375** | |
| **Family history of CVD** | | |
| Yes | 209 | 55.7 |
| No | 166 | 44.3 |
| **Total** | **375** | |

Source: Primary data, 2023

**Status of blood pressure among car free day sports participants in Kigali-city**

The first objective of this study was to determine the prevalence of elevated blood pressure among car free day sports participants in Kigali-city, where the study participants were screened to have exact situation of their blood pressure. Therefore, Table 3 summarized the findings on the status of blood pressure among car free day sports participants in Kigali-city where 66.4% of the respondents had a normal BP (<120 systolic and <80 mm Hg diastolic); 21.3% had elevated BP (120–129 systolic and <80 mm Hg diastolic); 8.6% had pre-hypertension (130–139 systolic and 80–89 mm Hg diastolic) while 3.7% had hypertension (≥140 systolic and ≥90 mm Hg diastolic).

**Table 3: Status of blood pressure among car free day sports participants in Kigali-city**

| Variables | Frequency | Percentage |
|---|---|---|
| Normal (<120 systolic and <80 mm Hg diastolic) | 249 | 66.4 |
| Elevated (120–129 systolic and <80 mm Hg diastolic) | 80 | 21.3 |
| Pre-hypertension (130–139 systolic and 80–89 mm Hg diastolic) | 32 | 8.6 |
| Hypertension (≥140 systolic and ≥90 mm Hg diastolic) | 14 | 3.7 |
| **Total** | **375** | **100** |

Source: Primary data, 2023

**Factors associated with elevated blood pressure among car free day sports participants in Kigali-city**

The second objective of this study was to identify the factors associated with elevated blood pressure among car free day sports participants in Kigali-city. The researcher asked a set of questions about the lifestyle in matters related to blood pressure situation to the participants. After those questions, participants' measures were taken on their height, weight, BMI, waist circumference and HIP circumference. The cross sectional analysis of the results of from those questions with the prevalence of elevated blood pressure helped the researcher to highlight the different factors associated to it.

**Socio demographic factors associated with elevated blood pressure within car free day sports participants in Kigali-city**

The findings of this study showed that the relationship of five factors (Age, Marital Status, education, wealth index and occupation) towards elevated BP, were statistically significant with $p<0.05$. The participants being aged more than 50 years old presented a positive relationship with elevated BP with 79.9%, $X^2=74.277$, $p<0.001$; Also, the participants being single presented a positive relationship with the absence of elevated BP with 82.4%, $X^2=17.989$, $p<0.002$. Also, the participants having lower level of education presented a positive relationship with the absence of elevated BP with 90.9% of those who were not educated and 80.2% of those who have done only primary school, $X^2=51.716$, $p<0.001$. Being recorded in the category of poor presented a positive relationship with the absence of elevated BP with 90.2%, $X^2=243.254$, $p<0.001$ and working as a blue collar presented a positive relationship with the absence of elevated BP with 87.2%, $X^2=78.624$, $p<0.001$. In summary, sex and religion presented no relationship with elevated BP.

**Table 4: Bivariate analysis of socio demographic factors associated with elevated blood pressure within car free day sports participants in Kigali-city**

| Particulars | Elevated blood pressure | | Chi-square | P-value |
|---|---|---|---|---|
| | No n(%) | Yes n(%) | | |
| **Sex** | | | 0.15 | 0.902 |
| Male | 140(66.7) | 70(33.3) | | |
| Female | 109(66.1) | 56(33.9) | | |
| **Total =375** | | | | |
| **Age** | | | | |
| Less than 40 years | 95 (96) | 4 (4) | 74.277 | **0.001** |
| 40-50 | 125(94.7) | 7(5.3) | | |
| More than 50 | 29(20.1) | 115(79.9) | | |
| **Total =375** | | | | |
| **Marital Status** | | | 17.989 | **0.002** |
| Single | 89 (82.4) | 19 (17.6) | | |
| Married | 110(61.5) | 69 (38.5) | | |
| Divorced/widower | 50(56.8) | 38(43.2) | | |
| **Total =375** | | | | |
| **Education level** | | | 51.716 | **0.001** |
| Not educated | 40 (90.9) | 4 (9.1) | | |
| Primary | 101(80.2) | 25 (19.8) | | |
| Secondary | 87(60) | 58(40) | | |
| University | 21(35) | 39(65) | | |
| **Total =375** | | | | |
| **Wealth index** | | | 43.254 | **0.001** |
| Poor | 37(90.2) | 4(9.8) | | |
| Middle | 173(72.7) | 65(27.3) | | |
| Rich | 39(40.6) | 57 (59.4) | | |
| **Total =375** | | | | |
| **Religion** | | | 6.118 | 0.944 |
| Catholic | 94(62.3) | 57(37.7) | | |
| Protestant | 87 (72.5) | 33 (27.5) | | |
| Muslim | 42 (72.4) | 16 (27.6) | | |
| No religion | 26 (56.5) | 20 (43.5) | | |
| **Total =375** | | | | |
| **Occupation** | | | 78.624 | **0.001** |
| Blue collar (Workforce) | 170(87.2) | 25 (12.8) | | |
| White collar (Non workforce) | 79 (43.9) | 101(56.1) | | |
| **Total=375** | | | | |

Source: Primary data, 2023

**Medico-surgical history factors associated with elevated blood pressure among car free day sports participants in Kigali-city**

The findings of this study showed that having a family member who have hypertension problems presented a positive relationship with elevated BP with 56%, $X^2$=76.002, p<0.001; having a family member who have diabetes mellitus problems presented a positive relationship with elevated BP with 57.1%, $X^2$=68.315, p<0.001 and having a family member who have CVD problems presented a positive relationship with elevated BP with 56%, $X^2$=65.274, p<0.001;

**Table 5: Bivariate analysis of medico-surgical history factors associated with elevated blood pressure within car free day sports participants in Kigali-city**

| Particulars | Elevated blood pressure | | Chi-square | P-value |
|---|---|---|---|---|
| | No n(%) | Yes n(%) | | |
| **Family history of hypertension** | | | 76.002 | **0.001** |
|   Yes | 92 (44) | 117(56) | | |
|   No | 157(94.6) | 9(5.4) | | |
| **Total =375** | | | | |
| **Family history of diabetes mellitus** | | | | |
|   Yes | 88 (42.9) | 117(57.1) | 68.315 | **0.001** |
|   No | 161(94.7) | 9(5.3) | | |
| **Total =375** | | | | |
| **Family history of CVD** | | | 65.274 | **0.001** |
|   Yes | 92 (44) | 117 (56) | | |
|   No | 157(94.6) | 9 (5.4) | | |
| **Total=375** | | | | |

Source: Primary data, 2023

**Lifestyle factors associated with elevated blood pressure among car free day sports participants in Kigali-city**

The findings in Table 6 showed that the relationship of five factors (Alcohol consumption, High salted foods consumption, Fruit and vegetable consumption, Physical Exercises and Smoking)

towards elevated BP, were statistically significant with p<0.05. The participants being a regular alcohol consumer presented a positive relationship with elevated BP with 82.2%, $X^2$=92.004, p<0.001; Also, the participants being a regular high salted foods consumer presented a positive relationship with elevated BP with 55.4%, $X^2$=84.059, p<0.001;The participants being a regular fruit and vegetables consumer presented a positive relationship with the absence of elevated BP with 12.2%, $X^2$=121.236, p<0.001;The participants being a regular practitioner of physical exercises presented a positive relationship with the absence of elevated BP with 11.4%, $X^2$=77.104, p<0.001 and the participants being a current smoker presented a positive relationship with elevated BP with 69.6%, $X^2$=77.104, p<0.001.

**Table 6: Bivariate analysis of lifestyle factors associated with elevated blood pressure within car free day sports participants in Kigali-city**

| Particulars | Elevated blood pressure | | Chi-square | P-value |
|---|---|---|---|---|
| | No n(%) | Yes n(%) | | |
| **Alcohol consumption** | | | 92.004 | **0.001** |
| Very often | 24 (17.8) | 111(82.2) | | |
| Sometimes | 125(92.6) | 10(7.4) | | |
| No consumption | 100(95.2) | 5 (4.8) | | |
| **Total =375** | | | | |
| **High salted foods consumption** | | | 84.059 | **0.001** |
| Very often | 91 (44.6) | 113(55.4) | | |
| Sometimes | 37(84.1) | 7 (15.9) | | |
| No consumption | 121(95.3) | 6 (4.7) | | |
| **Total =375** | | | | |
| **Sugar consumption** | | | 3.973 | **0.090** |
| Very often | 63 (50.4) | 62(49.6) | | |
| Sometimes | 68(55.7) | 54(44.3) | | |
| No consumption | 79(61.7) | 49(38.3) | | |
| **Total =375** | | | | |
| **Fruit and vegetable consumption** | | | 121.236 | **0.001** |
| Very often | 208(87.8) | 29 (12.2) | | |
| Sometimes | 36 (64.3) | 20(35.7) | | |
| No consumption | 5(6.1) | 77(93.9) | | |
| **Total =375** | | | | |
| **Physical Exercises** | | | 142.254 | **0.001** |
| Very often | 225(88.6) | 29 (11.4) | | |
| Sometimes | 18 (47.4) | 20 (52.6) | | |
| No exercises | 6 (7.2) | 77 (92.8) | | |
| **Total =375** | | | | |
| **Smoking** | | | 77.104 | **0.001** |

| | | |
|---|---|---|
| Never smoked | 133(97.1) | 4 (2.9) |
| Former smoker | 92 (57.9) | 67 (42.1) |
| Current smoker | 24 (30.4) | 55 (69.6) |
| **Total =375** | | |

Source: Primary data, 2023

**Metabolic factors associated with elevated blood pressure among car free day sports participants in Kigali-city.**

The findings in Table 7 showed that the relationship of the two factors (BMI and Waist to HIP Ratio) towards elevated BP were statistically significant with $p<0.05$. The participants having $\geq30$ of BMI presented a positive relationship with elevated BP with 87.2%, $X^2=175.236$, $p<0.001$ and the participants having a waist to HIP ratio of $\geq0.86$ for Male and $>1.0$ for Female presented a positive relationship with elevated BP with 67.9%, $X^2=97.271$, $p<0.001$.

**Table 7: Bivariate analysis of metabolic factors associated with elevated blood pressure within car free day sports participants in Kigali-city**

| Particulars | Elevated blood pressure | | Chi-square | P-value |
|---|---|---|---|---|
| | Non(%) | Yes n(%) | | |
| **BMI** | | | 175.236 | **0.001** |
| $\leq24.9$ | 210(95.9) | 9 (4.1) | | |
| 25-29.9 | 23 (74.2) | 8 (25.8) | | |
| $\geq30$ | 16 (12.8) | 109(87.2) | | |
| **Total =375** | | | | |
| **Waist to HIP ratio** | | | | |
| $\leq0.80$(M) $\leq0.95$ (F) | 21 (75) | 7 (25 | 97.271 | **0.001** |
| 0.81-0.85(M) 0.96-1.0 (F) | 177(94.1) | 11 (5.9) | | |
| $\geq0.86$ (M) $>1.0$ (F) | 51 (32.1) | 108(67.9) | | |
| **Total =375** | | | | |

Source: Primary data, 2023

**Multivariate analysis of factors associated with elevated blood pressure within car free day sports participants in Kigali-city**

The findings of this study as shown in Table 8, demonstrated that participants aged more than 50years old were ten times more likely to be associated with elevated BP with AOR 8.255 95% CI (7.325-36.224), $p<0.001$. Also, being rich was seven times more likely than being poor associated to elevated BP, AOR 7.223 95% CI (6.254-24.226), $p<=0.001$. Also, working as white

collar was 7.8 more less likely than working as blue collar associated to elevated BP, AOR7.89295% CI (1.345-9.245), p<=0.001. Having a family member with hypertension problems was 22.185 times more likely associated to elevated BP, AOR22.185 95% CI (10.743-45.814), p<=0.001. Being a regular alcohol consumer was 12.5 times more likely associated to elevated BP, AOR12.5 95% CI (14.005-51.614), p<=0.001.Not consuming fruit and vegetables was 9 times more likely associated to elevated BP, AOR9.25695% CI (4.250-16.322), p<=0.001.Not practicing physical exercises was 13 times more likely associated to elevated BP, AOR13.247 95% CI (12.345-36.550) p<=0.001.Smoking was 8 times more likely associated to elevated BP, AOR 8.221 95% CI (7.785-29.351), p<=0.001.Having ≥30of BMI was 7 times more likely associated to elevated BP, AOR7.248 95% CI (3.204-19.200), p<=0.001and having a waist to HIP ratio of ≥0.86 for Male and >1.0 for Female was 7.5 times more likely associated to elevated BP, AOR7.522 95% CI (1.225-8.337), p<=0.002.

**Table 8 Multivariate analysis of factors associated with elevated blood pressure within car free day sports participants in Kigali-city**

| Particulars | AOR | 95% C.I | | P-value |
|---|---|---|---|---|
| | | Lower | Upper | |
| **Age** | | | | |
| Less than 40 years | Ref. | | | |
| 40-50 | 8.255 | 7.325 | 36.224 | |
| More than 50 | 10.210 | 9.105 | 34.522 | **0.001** |
| **Wealth index** | | | | |
| Poor | Ref. | | | |
| Middle | 4.120 | 2.224 | 12.377 | |
| Rich | 7.223 | 6.254 | 24.226 | **0.001** |
| **Occupation** | | | | |
| Blue collar (Workforce) | Ref. | | | |
| White collar (Non workforce) | 7.892 | 1.345 | 9.245 | **0.001** |
| **Family history of hypertension** | | | | |
| Yes | 22.185 | 10.743 | 45.814 | **0.001** |
| No | Ref. | | | |
| **Alcohol consumption** | | | | |
| Very often | 12.500 | 14.005 | 51.614 | **0.001** |
| Sometimes | 1.600 | 0.530 | 4.832 | |
| No consumption | Ref. | | | |
| **Fruit and vegetable consumption** | | | | |
| Very often | Ref. | | | |
| Sometimes | 6.110 | 3.241 | 14.255 | |

| | | | | |
|---|---|---|---|---|
| No consumption | 9.256 | 4.250 | 16.322 | **0.001** |
| **Physical Exercises** | | | | |
| Very often | Ref. | | | |
| Sometimes | 6.378 | 5.200 | 24.359 | |
| No exercises | 13.247 | 12.345 | 36.550 | **0.001** |
| **Smoking** | | | | |
| Never smoked | Ref. | | | |
| Former smoker | 3.114 | 1.012 | 6.241 | |
| Current smoker | 8.221 | 7.785 | 29.351 | **0.001** |
| **BMI** | | | | |
| ≤24.9 | Ref. | | | |
| 25-29.9 | 4.188 | 3.228 | 17.330 | |
| ≥30 | 7.248 | 3.204 | 19.200 | **0.001** |
| **Waist to HIP Ratio** | | | | |
| ≤0.80(M) ≤0.95 (F) | Ref. | | | |
| 0.81-0.85(M) 0.96-1.0 (F) | 4.208 | 3.254 | 17.246 | |
| ≥0.86 (M) >1.0 (F) | 7.522 | 1.225 | 8.337 | **0.002** |

Source: Primary data, 2023

## DISCUSSION

The main objective of this study was to determine the prevalence and factors associated with elevated blood pressure among car free day sports participants in the City of Kigali. The study revealed that that about one third of car free day sports participants in Kigali-city live with elevated blood pressure. In addition, aging, Family history of hypertension, diabetes mellitus and CVD, Alcohol consumption, Smoking, High salted foods consumption are positively associated to the presence of elevated blood pressure (Risk factors) while Physical Exercises, Fruit and vegetable consumption are negatively associated to the presence of elevated blood pressure (Protective factors).These results can be well explained that the Government should put in place a program helping to sensitize the population to adhere to positive lifestyle in order to diminish the prevalence of BP among the population specifically consumption of fruit and vegetables, practice physical exercises, avoid smoking and diminish salt and fat consumption because it was found that different lifestyle of the population expose them to elevated blood pressure; and the Government in partnership with NGOs should seek the effective manner of fighting NCDs as it has been found that medico-surgical history of the population constitutes a risk factor of elevated blood pressure.

This study findings on the prevalence of elevated blood pressure among car free day sports participants in Kigali-city showed that 66.4% of the respondents had normal blood pressure; 21.3%

had elevated blood pressure; 8.6% had pre-hypertension while 3.7% had hypertension. These results were reported to be almost similar to the results obtained by Cappuccio et al. (2019) in their study entitled "Prevalence, detection, management, and control of elevated blood pressure in England". This study revealed a high level of elevated blood pressure among adult women and men in England. According to these authors, the age-adjusted prevalence of elevated blood pressure varies from 18% to 32% in England. The reason for this similarity might be due to the similarity of the areas of the study which are both cities: Kigali City and Bristol City. Both studies have been conducted in urban areas where some habits are almost the same even if the two studies have been conducted in different countries and continents.

However, the findings of the present study seem to be higher compared to the ones found by Yusuf et al. (2017) where they found a prevalence of elevated blood pressure in 33% of adult population aged at least 18 years. In much older populations in Nigeria (40 years and over), the prevalence of hypertension was over 45%. This prevalence reflects the extent of hypertension in African countries in general and in Nigeria in particular (Yusuf et al., 2017). The reason for this discrepancy might be due to differences in place of residence of the participants to those studies. Indeed, the present study was conducted in Kigali city while the one conducted by Yusuf et al. (2017) concerned particularly rural areas.

Concerning the factors associated to elevated BP, the present study found that having ≥30of BMI was 7 times more likely associated to elevated BP, AOR7.248 95% CI (19.200-3.204), p<=0.001. These results are similar to those found by Dempsey et al. (2020) in which they showed that a loss of 5.1 kg was associated with a decrease in SBP by 4.4 mm Hg and DBP by 3.6 mm Hg. In this study, obesity is indexed as a factor of cardiovascular risk. A high body mass index (BMI) increases the risk of myocardial infarction, coronary insufficiency and sudden death. Dempsey et al. (2020) showed that subjects with a normal BMI have a prevalence of hypertension of between 20 and 30%, while overweight or obese subjects had a prevalence greater than 40%. The reason

for this similarity may be the resemblance of the place of the two studies because they have all been conducted in cities and the citizen habits are almost the same all over the world.

However, the present study found no difference of BP between men and women in matters related to BP among car free day sports participants in Kigali-city. These results differ from those found by Anteneh et al. (2015) in which they discovered that hypertension is generally less common in women before menopause, but increases during menopause. Other studies on sex as a risk factor have shown discrepancy. Indeed, a greater prevalence is observed in men in studies on NCD risk factors (Steyn et al. (2020) while hypertension is very prevalent in women (Agyemang et al. (2006). The results obtained by Chow et al. on smoking, alcohol, fat food, processed food and elevated BP are almost the same as the results of the present study with very little differences. The similarity of the findings between the present study and Chow et al.'s one may be explained by the resemblance of the population who participated to the two studies because the present study considered the participants of car free day sports and Chow et al. considered the population encountered in different sport sites.

In summary, this study has some strengths and limitations; its findings reflect the opinion of the car free day sports participants in Kigali-city. Also, the researcher was able to work with key organizers of this monthly event. Since our key data collectors were organizers of this event, this may have given us more force and credibility to the findings. However, some participants might have feared to give real information related to their lifestyle such as alcohol consummation. Indeed, some of them might not have been able to tell data collectors that they take alcohol every day because it would be seen as irresponsible behaviour. However, the obtained information covers the essential situation of elevated BP among car free day sports participants in Kigali-city and the suggestions framed could constitute a better solution to the said situation.

**Conclusion**

Generally, this study revealed that about one third of car free day sports participants in Kigali-city live with elevated blood pressure. In addition, aging, Family history of hypertension, diabetes mellitus and CVD, Alcohol consumption, Smoking, High salted foods consumption are positively associated to the presence of elevated blood pressure (Risk factors) while Physical Exercises, Fruit and vegetable consumption are negatively associated to the presence of elevated blood pressure (Protective factors).

## Limitations of the study

As the study used a cross-sectional design, and only car free day sports participants in Kigali were eligible to provide information, the result of this study was not generalized either to the whole population of Rwanda or to all the inhabitants of the City of Kigali. However, this information can provide insight into the prevalence and the factors associated with elevated blood pressure among the population of Rwanda. In addition, the study was limited to its design as a cross sectional study.

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