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Correlation between age advancement and cardiomegaly in the context of climate change in kinshasa in Democratic Republic of Congo

Correlation entre avancement en age et cardiomegalie dans le contexte de changement climatique à kinshasa en République Démocratique du Congo

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Abstract

Introduction : Backgrounde and aims : Humanity is facing the threat of climate change. Climate-sensitive health risks are disproportionately felt globally, with vulnerable and disadvantaged people (elderly populations and people with comorbidities) bearing the brunt of the victims. The objective of this study was to analyze the correlation between advancing age and cardiomegaly in the context of climate change in Kinshasa/DR Congo.

Matéral an methods : The present joint study used a secondary analysis and a literature review within a consecutive series based on information contained in medical records available at CIMR from January 2020 to January 2021 around epidemiological, climatic and chest radiography variables. Bivariate correlations were used to calculate a statistical association between CTI values and values for the rest of the variables of interest (socio-demographic and environmental/climatic variables).

Results : There was a slight overrepresentation of women (n=98) than men (n=67). The age distribution of all patients was normal/symmetric with a histogram surmounted by a Gaussian curve. There was a positive and significant bivariate correlation between age (r = 0.258; P<0.0001), Kin flood climate (r= -0.177; P<0.0001), and the elevation of CTI. CMR proportions increased very significantly (chi-square trend test = 28.064; P< 0.0001) and exponentially from age ≥63 to age ≥77 years: n=21/43 in age 63-68 years, n=26/40 in age 69-76 years, n=5/38 in age≥ 77 years.

Conclusion : The present study showed that there is a correlation between advancing age and cardiomegaly in relation to climate change, better the local neo-climate of Kinshasa.

Keywords : Correlation, Age advancement, cardiomegaly, Climate change

Résumé

Introduction : Contexte et objectifs : L'humanité est confrontée à la menace du changement climatique. Les risques sanitaires liés au climat sont ressentis de manière disproportionnée à l'échelle mondiale, les personnes vulnérables et défavorisées (les populations âgées et les personnes souffrant de comorbidités) étant les plus touchées.
Les personnes âgées et les personnes souffrant de comorbidités) sont les plus touchées. L'objectif de cette étude était d'analyser la corrélation entre l'avancée en âge et la cardiomégalie dans le contexte de l'épidémie de grippe.

Méthodes : La présente étude conjointe a utilisé une analyse secondaire et une revue de la littérature au sein d'une série consécutive basée sur informations contenues dans les dossiers médicaux disponibles au CIMR de janvier 2020 à janvier 2021 autour de variables épidémiologiques, climatiques et de radiographie pulmonaire. Des corrélations bivariées ont été utilisées pour calculer une association statistique entre les valeurs de l'ITC et les valeurs des autres variables d'intérêt (sociodémographiques et environnementales/climatiques).

Résultats : Il y a eu une légère surreprésentation des femmes (n=98) par rapport aux hommes (n=67). La distribution de l'âge de tous les patients était normale/symétrique avec un histogramme surmonté d'une courbe gaussienne. Il y avait une bivariation positive et significative entre les deux groupes.
Il y avait une corrélation bivariée positive et significative entre l'âge (r = 0,258 ; P<0.0001), le climat de l'inondation de Kin (r= -0.177 ; P<0.0001) et l'élévation de l'ITC. Les proportions de CMR ont augmenté de manière très significative (test de tendance chi-carré = 28,064 ; P<0,0001) et de façon exponentielle de l'âge ≥63 à l'âge ≥77 ans : n=21/43 à l'âge 63-68 ans, n=26/40 à l'âge 69-76 ans, n=5/38 à l'âge≥ 77 ans.

Conclusion : La présente étude a montré qu'il existe une corrélation l'âge et la cardiomégalie en relation avec le changement climatique mieux le néo-climat local de Kinshasa.

Mots clés : Corrélation, âge, cardiomégalie, Changement climatique

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Introduction

Humanity is facing the threat of climate change [1-5]. Climate-sensitive health risks are disproportionately felt globally, with vulnerable and disadvantaged people (elderly populations and people with comorbidities) bearing the brunt of the victims 0[6-9]. In 2005, when Hurricane Katrina hit New Orleans in the United States, 75% of those who died were over 60 years of age [10].

It is established that enlargement of the cardiac silhouette (Cardiomegaly), both in the form of dilation or hypertrophy, leads to a spectrum of clinical heart failure syndrome [11-13].

Studies have shown that heart failure in the elderly can have an insidious onset because multiple comorbidities can obscure symptoms that make it difficult to diagnose chronic heart failure in the elderly [14-16].

Cardiomegaly combined with clinical signs such as fatigue, dyspnea, signs of overload, and peripheral edema argue for heart failure [17-19]. The size of the heart varies with advancing age, the presence of ischemic heart disease, or pericardial effusion [20]. The assessment of the size of the LV can be done using several techniques including cardiac ultrasound, coroscanner and cardiac MRI [21].

Chest X-ray is an essential diagnostic tool in areas where cardiac Doppler ultrasound (gold standard) is rare and inaccessible [22-24]. This excellent monitoring tool makes it possible to obtain a differential diagnosis, and impact of cardiomegaly [22-26].

The objective of this study was to analyze the correlation between advancing age and cardiomegaly in the context

of climate change in Kinshasa, Democratic Republic of Congo.

Materials and method

The present joint study used a secondary analysis and a literature review within a consecutive series based on information contained in medical records available at CIMR from January 2020 to January 2021 around epidemiological, climatic and chest radiography variables. 165 patients aged 54 to over 77 years in whom cardiomegaly was found , were included in this study.

Radiological exploration tools, techniques and procedures

X-ray apparatus and equipment

The X-ray images were acquired using an Allengers-525 x-ray equipment, modulated by a control panel. This machine was manufactured in India in 2018 and put into service in 2019. A CR15 digitizer made in Turkey in 2013, commissioned in 2015, allowed the transformation of radiant images into digital images.

Conduct of the review

The patient was standing with his chest against the wall bucky, legs slightly apart, strictly frontal. The arms were placed in internal rotation (the palms of the hands looking back) then the arms slightly bent, the backs of the hands placed on the hips, the elbows were carried forward to spread the shoulder blades.

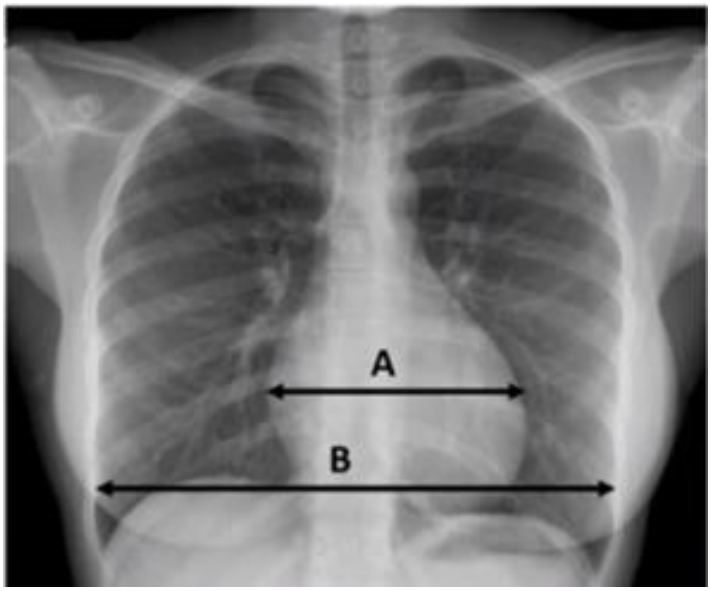

Figure 1 : Calculation of ICT by the tangential method

The acquisition was made thanks to an X-ray tube, the guiding radius was horizontal centered on the line of the spines, at the height of the lower angles of the scapulas in sufficient or deep inspiration and apnea at a focus-film distance of 1.80 m with the tension of 90 KV, 5 mAs.

A digitizer made it possible to transform the analog image into an archivable digital signal using a computer kit.

The images were read on a computer screen using K-pacs software. The calculation of the CTI was done by the tangential method by dividing the transverse diameter of the heart by the thoracic diameter (Figure 1).

Statistics

Bivariate analyses and concordance

Bivariate correlations were used to calculate a statistical association between CTI values and values for the rest of the variables of interest (socio-demographic and environmental/climatic variables).

Thus, the different associations were studied according to the following coefficients : Pearson parametric r-coefficient; Kendall W coefficient and non parametric Spearman's Rho coefficient

Ethical considerations

During this study, the identity of each patient was changed to a number and was not accessible to people outside the study. The data collected on patients were therefore confidential and anonymous according to the Declaration of Helsinki 3. The protocol of this study was presented and approved by the National Ethics Committee at No. 408/CNES/BN/PMMF/2022.

Results

Descriptive approach to variables of interest

Sex and age

There was a slight overrepresentation of women (n=98) than men (n=67). The age distribution of all patients was normal/symmetric with a histogram surmounted by a Gaussian curve (Figure 2) according to the following statistics : central tendency/mean value=63.6 years;, central tendency/median value=65 years;, central tendency/modal value=67 years; dispersion/standard error of the mean=1.11 years. Ecart-Type dispersion=15.4 years; dispersion /variance=238.3 and distribution/skewness=-0.636. The distribution/Kurtosis/coeff of asymmetry=0.910., Thus, the age quintiles of all patients were characteristic and reported as follows: quintile 1=54 years-62 years n=44,

quintile 2=63 years-68 years n= 43, quintile 3=69 years-76 years n=40, quintile4≥77yearsn=38.

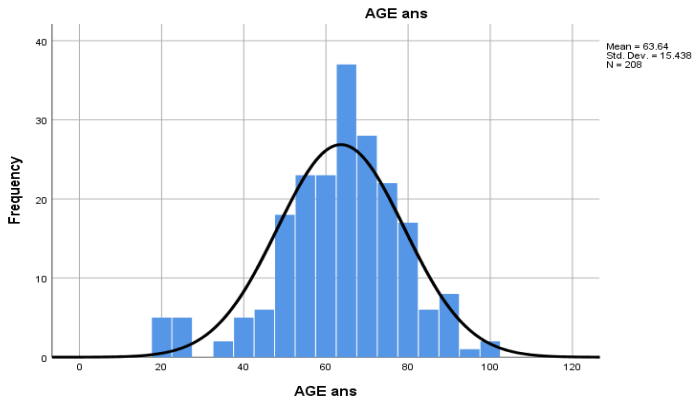

Figure 2: Distribution of patients by age histogram.

Interactions climate change/climate variability-local climate of kinshasa

The total study population was confronted with the interactions between global climate change and Kinshasa's seasons: January-March: short dry season pro flood, La nina 2020-2021 (n=56), April-May: short rainy season-La nina 2020-2021 (n=37), June-September: La nina 2020-2021 dry season (n=49) and October-December: long rainy season-pro flood (n=12).

Bivariate analyses

There was a positive and significant bivariate correlation between age (r = 0.258; P<0.0001), Kin flood climate (r= -0.177; P<0.0001), and the elevation of CTI.

Comparison of CME values

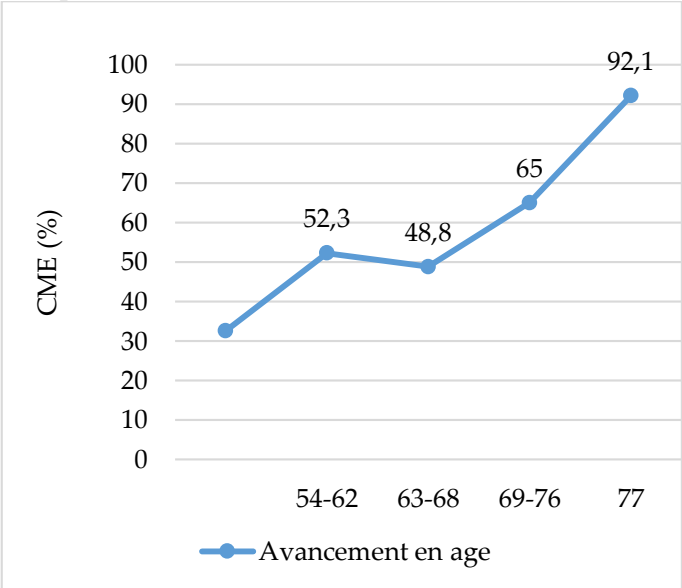

Figure 3: Proportion of CME with advancing age.

Advencing and CMR

CMR proportions increased very significantly (chi-square trend test = 28.064; P< 0.0001) and exponentially from age ≥63 to age ≥77 years: n=21/43 in age 63-68 years, n=26/40 in age 69-76 years, n=5/38 in age≥ 77 years (Figure 3).

Discussion

Sex and age

In contrast to the global literature on CVD, women were the most common in the present study corroborating a Zambian study by Nchimunya Gwaba, who also found that the female sex was in the majority. [19]

Lien et at [15], founded rhat one hundred in sixteen consecutive patients (31 men, 85 women) who were included in the analysis, median age was 86 years (range 65–98), and 82% (95/116) were aged 75 years and above. The median discharge Barthel score was 18/20 (range 0–20) and median MSQ was 9/10 (range 0–10)

In general, African women use health services more than men. With the upheaval of globalization, the present study examined senior patients with a median of 65 years, corroborating the post-health transition phase best assessed by the LMB team and by other African teams such as the study of Nchimunya Gwaba, who had found an average age of 63 years. Indeed, the sanitary transition in its epidemiological transition form is characterized by a high prevalence of NCDs including CVD. Advancing age is also associated with oxidative stress and geriatric syndrome.

Season

La nina

The current study examined patients during the two consecutive years of climate variability including 2020 and 2021. [4,5]

In contrast to the global climate, it was the local neo-climate of Kinshasa characterized by the large excessively flooding rainy season, the sometimes flooding long rainy season and the small pro-flooding dry season, which conferred an excess of risk respectively of patients with CMR in the present study. [12,13-16]

In our study, population was confronted with the interactions between global climate change and Kinshasa's seasons: January-March: short dry season pro flood, La nina 2020-2021 (n=56), April-May: short rainy season-La

nina 2020-2021 (n=37), June-September: La nina 2020-2021 dry season (n=49) and October-December: long rainy season-pro flood (n=12).

The volcanic signals tend to mask any nonvolcanically driven change, making them difficult to understand. While the role of carbonyl sulfide as a substantial and relatively constant source of stratospheric sulfur has been confirmed by new observations and model simulations, large uncertainties remain with respect to the contribution from anthropogenic sulfur dioxide emissions. New evidence has been provided that stratospheric aerosol can also contain small amounts of nonsulfate matter such as black carbon and organics. [4]

Conclusion

The present study showed that there is a correlation between advancing age and cardiomegaly in relation to climate change, better the local neo-climate of Kinshasa.

Conflict of Interest : None

Author's Contributions

KNF and MSC designed and analyzed the statistical data for the study. VVR and ME contributed to the data collection. LMB, TKZ, WOS and KT supervised the study.

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