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Research Article

Blood Pressure Control and Its Determinants Among 1,267 Guinean Pilgrims Attending a Mass Gathering Medical Post: A Cross-Sectional Study

Contrôle Tensionnel et ses Déterminants chez 1 267 Pèlerins Guinéens Consultant Dans un Poste Médical de Rassemblement de Masse : Une Étude Transversale

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ABSTRACT

Introduction. Hypertension is the most frequently reported chronic condition among pilgrims attending mass religious gatherings, a context marked by extreme heat, exertion, and disrupted treatment. Guinean data on uncontrolled hypertension during the pilgrimage remain scarce. This study had as its purpose to estimate the prevalence of abnormal blood pressure and hypertensive crisis among Guinean pilgrims attending consultations, and to identify their determinants. **Methods**. Cross-sectional analysis of consultation data from a pilgrimage medical post. The primary outcome was a three-level blood pressure classification (normal, elevated, severe/crisis); two derived binary outcomes were modelled: abnormal blood pressure (elevated or severe) and severe hypertension (crisis). Adjusted odds ratios were estimated by multivariable logistic regression. **Results**. Among 1,267 pilgrims with measured blood pressure, 57.5% (95% CI 54.7–60.2) had abnormal blood pressure and 9.1% (95% CI 7.6–10.8) severe hypertension. Among the 481 pilgrims with known hypertension, 73.2% still had abnormal blood pressure despite usual treatment reported by 72.1%. Among the 582 pilgrims without known hypertension, 48.3% nonetheless had abnormal blood pressure, including 5.8% with a severe form. In the multivariable model, known hypertension remained the determinant most strongly associated with abnormal blood pressure (OR = 2.70, 95% CI 1.97–3.72) and severe hypertension (OR = 3.66, 95% CI 2.22–6.10); age was associated with abnormal blood pressure (OR = 1.02 per year, 95% CI 1.01–1.03). Reported usual treatment was not associated with any significant risk reduction. **Conclusion**. More than one consulting pilgrim in two had abnormal blood pressure, and reported usual treatment was not accompanied by satisfactory control. These findings argue for strengthening blood pressure control before and during the pilgrimage, beyond verifying usual medication use.

RÉSUMÉ

Introduction. L'hypertension est la maladie chronique la plus fréquemment rapportée chez les pèlerins participant à des rassemblements religieux de masse, un contexte marqué par une chaleur extrême, un effort physique soutenu et une perturbation des routines thérapeutiques. Les données guinéennes sur l'hypertension non contrôlée pendant le pèlerinage restent rares. Cette étude avait pour but d'estimer la prévalence de la pression artérielle anormale et de la crise hypertensive chez les pèlerins guinéens consultant, et d'en identifier les déterminants. **Méthodologie**. Analyse transversale des données de consultation d'un poste médical de pèlerinage. Le critère de jugement principal était une classification à trois niveaux de la pression artérielle (normale, élevée, sévère/crise) ; deux critères binaires dérivés ont été modélisés : pression artérielle anormale (élevée ou sévère) et hypertension sévère (crise). Les odds ratios ajustés ont été estimés par régression logistique multivariée. **Résultats**. Parmi 1 267 pèlerins avec pression artérielle mesurée, 57,5 % (IC 95 % : 54,7–60,2) avaient une pression artérielle anormale et 9,1 % (IC 95 % : 7,6–10,8) une hypertension sévère. Parmi les 481 pèlerins avec hypertension connue, 73,2 % avaient encore une pression artérielle anormale malgré un traitement habituel rapporté par 72,1 % d'entre eux. Parmi les 582 pèlerins sans hypertension connue, 48,3 % avaient néanmoins une pression artérielle anormale, dont 5,8 % une forme sévère. Dans le modèle multivarié, l'hypertension connue restait le déterminant le plus fortement associé à la pression artérielle anormale (OR = 2,70 ; IC 95 % : 1,97–3,72) et à l'hypertension sévère (OR = 3,66 ; IC 95 % : 2,22–6,10) ; l'âge était associé à la pression artérielle anormale (OR = 1,02 par an ; IC 95 % : 1,01–1,03). Le traitement habituel rapporté n'était associé à aucune réduction significative du risque. **Conclusion**. Plus d'un pèlerin consultant sur deux avait une pression artérielle anormale, et le traitement habituel rapporté ne s'accompagnait pas d'un contrôle satisfaisant. Ces résultats plaident pour un renforcement du contrôle tensionnel avant le départ et pendant le pèlerinage, au-delà de la simple vérification de la prise du traitement habituel.

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KEY RESULTS

What is already known on this topic. Hypertension is the most frequently reported chronic condition among pilgrims attending mass religious gatherings, with a pooled prevalence estimated at 12.2% and reaching 16.3% in some African and South Asian populations. The pilgrimage context — extreme heat, sustained exertion, disrupted routines — is physiologically demanding for people with chronic diseases, and adherence to usual antihypertensive treatment during the stay is a documented concern.

The question this study addressed. This cross-sectional analysis of consultation data from a pilgrimage medical post had as its purpose to estimate the prevalence of abnormal blood pressure and hypertensive crisis among Guinean pilgrims, and to identify their determinants, distinguishing those with already-known hypertension from those never previously diagnosed.

What the study adds to our knowledge. Among 1,267 pilgrims, 57.5% had abnormal blood pressure and 9.1% severe hypertension. Among the 481 with known hypertension, 73.2% still had abnormal blood pressure despite 72.1% reporting usual treatment. Among the 582 without known hypertension, 48.3% had abnormal blood pressure, including 5.8% with a severe form. Reported treatment was not associated with any significant risk reduction.

How this is relevant to clinical practice, policy or further research. These findings argue for strengthening blood pressure control before departure and during the pilgrimage, beyond simply verifying usual medication use, and for increased vigilance toward pilgrims without a known history.

INTRODUCTION

Hypertension remains one of the leading preventable causes of cardiovascular morbidity worldwide, affecting roughly one adult in three and more than one billion people in 2019 [1]. It is also the most frequently reported chronic condition among pilgrims attending a mass religious gathering, with a pooled prevalence estimated at 12.2% in a systematic review covering more than 285,000 pilgrims, but reaching 16.3% in some African and South Asian populations [2], and up to 16% among chronic conditions reported in a recent study of international pilgrims [3].

Mass religious gatherings expose pilgrims with chronic diseases to physiologically demanding conditions like extreme heat, sustained physical exertion over several days, disruption of sleep and hydration likely to destabilize hypertension that is otherwise controlled under usual conditions [4]. Cardiovascular diseases are among the leading causes of hospitalization and death during the pilgrimage, with an increased risk among pilgrims with severe-grade hypertension [5], and the most recent data confirm that chronic conditions and their complications continue to represent a substantial share of healthcare utilization during the stay [6]. A review of the mass gathering medicine literature highlights that non-communicable diseases, including cardiovascular complications, constitute a growing share of the morbidity burden managed by medical services at these events [4], and specific heat-risk mitigation strategies have been developed for the pilgrimage [7].

Adherence to usual antihypertensive treatment during the pilgrimage is a documented concern: a study among hypertensive pilgrims prior to departure found that, despite good disease awareness, medication compliance remained limited [8], an analysis of treatment adherence among pilgrims with chronic diseases confirmed inconsistent adherence despite frequent polypharmacy [9], and a recent multinational study reported that just over half of surveyed pilgrims had not taken their prescribed treatment during the stay [10].

In Guinea, hypertension already constitutes a major public health problem in the general population: the World Health Organization's national profile places hypertension among the country's leading cardiovascular risk factors [11], a national STEPS survey estimated its prevalence at 29.9%, with only 34.9% of known hypertensive individuals on treatment and 16.3% of these at a satisfactory level of control [12], and a more recent survey focused on older adults reported a standardized prevalence of 61.4% [13]. Despite this national context of high prevalence and poor control, to our knowledge no published study has specifically quantified the extent of uncontrolled hypertension and hypertensive crisis among Guinean pilgrims during the pilgrimage, nor identified the factors associated with it; a gap that the present study aims to address. The analysis follows the STROBE recommendations for cross-sectional studies [14,15].Given this context with an already high national prevalence of hypertension in Guinea, a pilgrimage context recognized as physiologically demanding for people with chronic diseases, yet the extent of blood pressure control during the stay remaining unknown -- we conducted the present study, whose overall objective was to estimate the prevalence of abnormal blood pressure and hypertensive crisis among Guinean pilgrims attending consultations, and to identify its determinants, distinguishing pilgrims with already-known hypertension from those never previously diagnosed.

PATIENTS AND METHODS

- Study design and setting

This study is based on a cross-sectional observational design, in the form of a secondary analysis of consultation data collected by a medical post accompanying a convoy of Guinean pilgrims, between 21 April and 11 June 2026, the period covering the annual pilgrimage to Mecca. Data came from medical consultation records completed on that occasion, including presenting complaints, known medical history, measured clinical parameters, and diagnoses recorded by the on-site clinical staff.

- Study population and eligibility criteria

The source population comprised all consultations recorded during the study period, that is, 1,287 records. Inclusion criteria were the availability of a blood pressure measurement and a plausible reported age, between 18 and 100 years; this latter criterion led to the exclusion of 20 records with an implausible age value. This procedure yielded a final analytic sample of 1,267 pilgrims.

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- **Sample size and sampling procedure**

The sample corresponds to an exhaustive, consecutive collection of all consultations recorded at the medical post during the study period, rather than a sample drawn according to a probabilistic sampling design; no weighting was therefore applied. Sample size was not determined a priori through a power calculation, but corresponds to the entire set of eligible consultations available over the period considered, this study being a secondary analysis of routine data rather than a dedicated survey.

- **Data collection and study variables**

Data were collected prospectively at each consultation by the medical post's clinical staff, using a standardized form. Blood pressure measured at each consultation was automatically classified into three levels by the collection system, using thresholds consistent with international guidelines for the management of hypertension [16,17]: normal, elevated (hypertension), or severe (hypertensive crisis). The dependent variables studied were two binary outcomes derived from this classification: abnormal BP, combining the elevated and severe levels, and severe hypertension, isolating hypertensive crisis alone. The independent variables -- exposures and covariates -- considered were hypertension status already known before the pilgrimage, reported usual antihypertensive treatment, age, sex, body temperature measured at the consultation, consultation site (Mecca/Haram versus other pilgrimage sites), and time of day (morning, afternoon, evening).

- **Data management and statistical analysis**

Records with an age outside the plausible range were excluded before any analysis, according to the eligibility criteria described above; pilgrims with missing data on a covariate of the multivariable model were further excluded from the adjusted analysis, using a complete-case approach. The analysis was then conducted in three steps. The characteristics of consulting pilgrims were first described using frequencies and proportions for categorical variables and means for continuous variables, all of which are presented in Table 1. The prevalence of abnormal BP and severe hypertension was then estimated overall, and stratified by known hypertension status, usual treatment, sex, consultation site, and age band, with 95% confidence intervals calculated using the Wilson method, to document the heterogeneity of the phenomenon before any adjustment (Table 2, Figures 2 and 3).

Determinants independently associated with abnormal BP were identified using multivariable logistic regression, simultaneously including known hypertension status, usual treatment, age, sex, body temperature, consultation site, and time of consultation; adjusted odds ratios and their 95% confidence intervals are reported in Table 3 and displayed in Figure 4 [14,15]. A second, identical model was fitted in parallel on severe hypertension, to determine whether the determinants of the most severe form differ from those of abnormal BP taken as a whole; the results of this comparison are presented in Table 4 and Figure 5. These seven covariates were selected a priori on theoretical and clinical grounds as plausible determinants of blood pressure control during the pilgrimage, rather than through a data-driven selection procedure; no stepwise or other automated variable selection method was used, consistent with recommended practice for models aimed at estimating adjusted associations for pre-specified exposures. Model fit and multicollinearity were assessed using McFadden's pseudo-R2, variance inflation factors (VIF), and a Hosmer-Lemeshow goodness-of-fit test.

- All statistical analyses and graphics were carried out using the R software [18]

RESULTS

Participant flow and construction of the analytic sample

Figure 1 presents the flow diagram for the construction of the analytic sample. Of the 1,287 consultations with measured blood pressure, 1,267 had a plausible age and were retained for the descriptive analysis; the multivariable model sample, after excluding missing covariate data, comprised 1,063 pilgrims.

- **Baseline characteristics of the pilgrims studied**

Table 1 describes the characteristics of the 1,267 consulting pilgrims included. Women accounted for a slight majority of the sample (56.4%). Just over one-third of pilgrims (38.0%) had hypertension already known before the pilgrimage, and 35.0% reported being on usual treatment. The large majority of consultations took place in Mecca, within the Haram precinct (86.8%). Mean age was 58.6 years and mean measured body temperature was 36.8 degrees Celsius. In terms of blood pressure, 49.3% of pilgrims had a hypertension-level alert and 9.2% a severe-level alert, for a combined 57.5% with blood pressure outside normal values.

- **Unadjusted prevalence of abnormal blood pressure by subgroup**

The prevalence of abnormal BP varied markedly by known hypertension status (Table 2): it reached 73.2% (95% CI 69.0-76.9) among pilgrims with already-known hypertension, versus 48.3% (95% CI 44.2-52.3) among those without a known history. The prevalence of severe hypertension followed the same gradient, from 5.8% among pilgrims without a known history to 15.6% among those with a known history. Pilgrims reporting usual treatment had a higher prevalence of abnormal BP (68.2%) than those not reporting treatment (51.7%), a gap that should be interpreted in light of the fact that treatment is logically more frequent among people already diagnosed with hypertension.

Figure 2 displays this same prevalence by subgroup. Figure 3 illustrates the relationship with age: the prevalence of abnormal BP generally increased with age, from 45.8% among 40-49-year-olds to 67.1% among those aged 70 years or older, with severe hypertension following a similar trend, more pronounced at the extreme ages.

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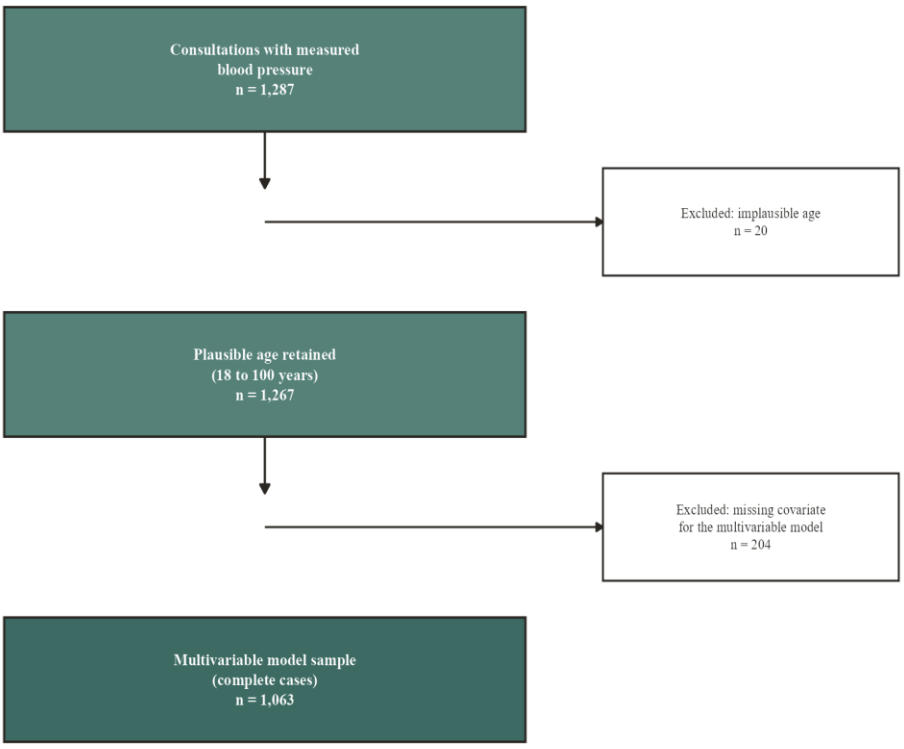

Figure 1. STROBE flow diagram showing the construction of the analytic sample, with exclusions at each step

Table 1. Characteristics of pilgrims attending consultations with measured blood pressure (n = 1,267)

Characteristic	Category	N	%
Sex	Male	552	43.6
	Female	715	56.4
Known hypertension status	Yes	481	38.0
	No	582	45.9
	Not recorded	204	16.1
On usual treatment	Yes	443	35.0
	No	824	65.0
Consultation site	Mecca (Haram)	1,100	86.8
	Other site (Mina/Arafat/Medina)	167	13.2
Time of consultation	Morning (before 12:00)	526	41.5
	Afternoon (12:00-18:00)	477	37.6
	Evening (after 18:00)	264	20.8
Age, mean	-	1,267	58.6 years
Body temperature, mean	-	1,267	36.8 degC
Blood pressure alert status	Normal	546	43.1
	Elevated (hypertension)	625	49.3
	Severe (crisis)	116	9.2

Unweighted counts and percentages (a sample of consulting pilgrims, not a probability sample of all pilgrims).

Table 2. Prevalence of abnormal blood pressure and severe hypertension, overall and by subgroup

Subgroup	Abnormal BP % (95% CI)	Severe hypertension % (95% CI)
Overall (n = 1,267)	57.5 (54.7-60.2)	9.1 (7.6-10.8)
Known hypertension (n = 481)	73.2 (69.0-76.9)	15.6 (12.6-19.1)
Unknown hypertension (n = 582)	48.3 (44.2-52.3)	5.8 (4.2-8.1)
On usual treatment (n = 443)	68.2 (63.7-72.3)	11.7 (9.1-15.1)
No usual treatment (n = 824)	51.7 (48.3-55.1)	7.6 (6.0-9.7)
Men (n = 552)	56.3 (52.2-60.4)	8.2 (6.1-10.7)
Women (n = 715)	58.3 (54.7-61.9)	9.8 (7.8-12.2)
Mecca, Haram (n = 1,100)	58.3 (55.3-61.2)	9.1 (7.5-10.9)
Other site (n = 167)	52.1 (44.6-59.5)	9.0 (5.5-14.3)

Abnormal BP = hypertension alert or severe hypertension. 95% confidence intervals (Wilson method).

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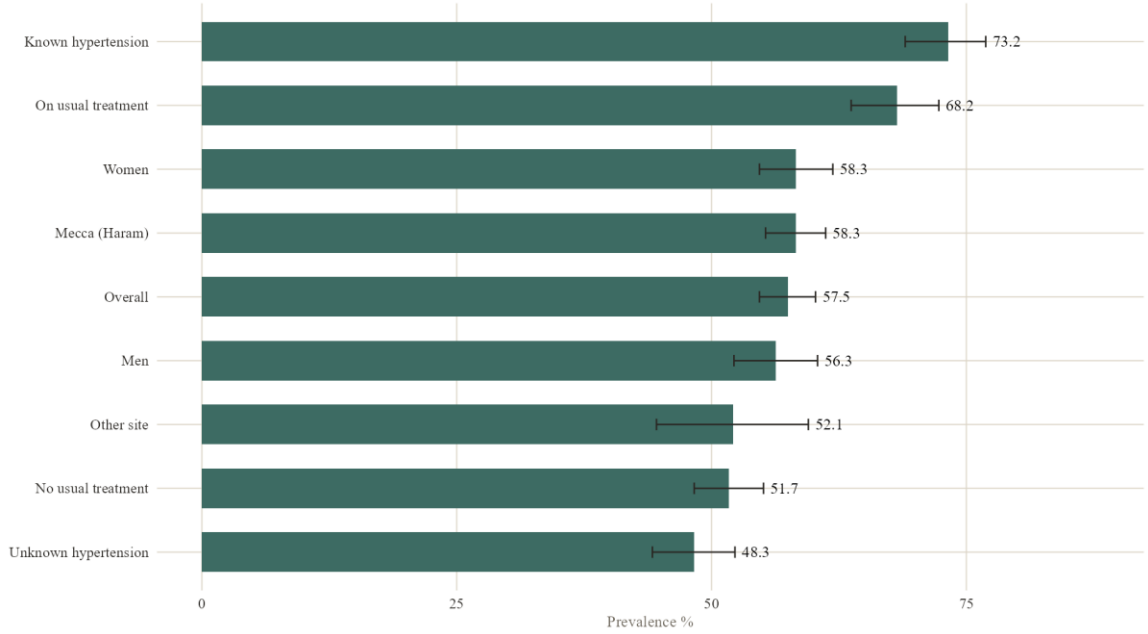

Figure 2. Prevalence of abnormal blood pressure by subgroup (n = 1,267 consulting pilgrims; bars = %, whiskers = 95% CI).

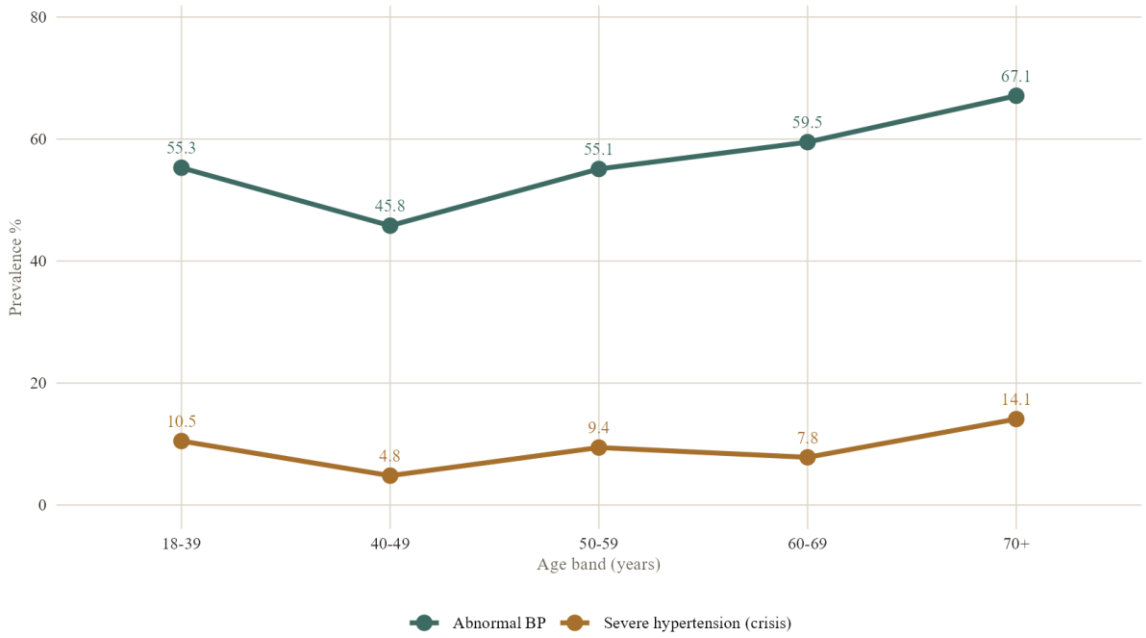

Figure 3. Prevalence of abnormal blood pressure and severe hypertension by age band, showing an increasing gradient with age, more pronounced for the severe form.

- **Multivariable determinants of abnormal blood pressure**

Table 3 presents the results of the multivariable logistic regression model for abnormal BP (n = 1,063 pilgrims). After mutual adjustment for all covariates, known hypertension remained strongly and significantly associated with abnormal BP (OR = 2.70, 95% CI 1.97-3.72, $p < 0.001$), as did age (OR = 1.02 per year, 95% CI 1.01-1.03, $p < 0.01$). Reported usual treatment, sex, body temperature, consultation site, and time of consultation were not significantly associated with abnormal BP in this adjusted model. Figure 4 displays all of these adjusted odds ratios and their 95% confidence intervals.

Abnormal blood pressure versus severe hypertension

To determine whether the determinants of abnormal BP also applied to hypertensive crisis alone, a second logistic model was fitted on the same covariates, for severe hypertension (Table 4, Figure 5).

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Table 3. Determinants of abnormal blood pressure; multivariable logistic regression

Variables	Adjusted OR	95% CI	P
Other site vs Mecca (Haram)	0.90	0.62-1.32	0.59
On usual treatment (vs not)	1.04	0.76-1.43	0.80
Known hypertension (vs unknown)	2.70	1.97-3.72	<0.001
Female sex (vs male)	1.05	0.81-1.37	0.70
Evening consultation (vs morning)	1.03	0.73-1.47	0.85
Body temperature (per degree)	0.99	0.79-1.23	0.89
Age (per year)	1.02	1.01-1.03	<0.01
Afternoon consultation (vs morning)	1.03	0.77-1.37	0.83

N = 1,063 pilgrims with complete covariates. Model mutually adjusted for all covariates listed. McFadden pseudo-R2 = 0.054; all VIF close to 1 (GVIF^(1/2Df) scale), indicating no multicollinearity concern. Hosmer-Lemeshow goodness-of-fit test (decile groups): chi2 = 9.00, df = 8, p = 0.34, indicating no evidence of poor calibration.

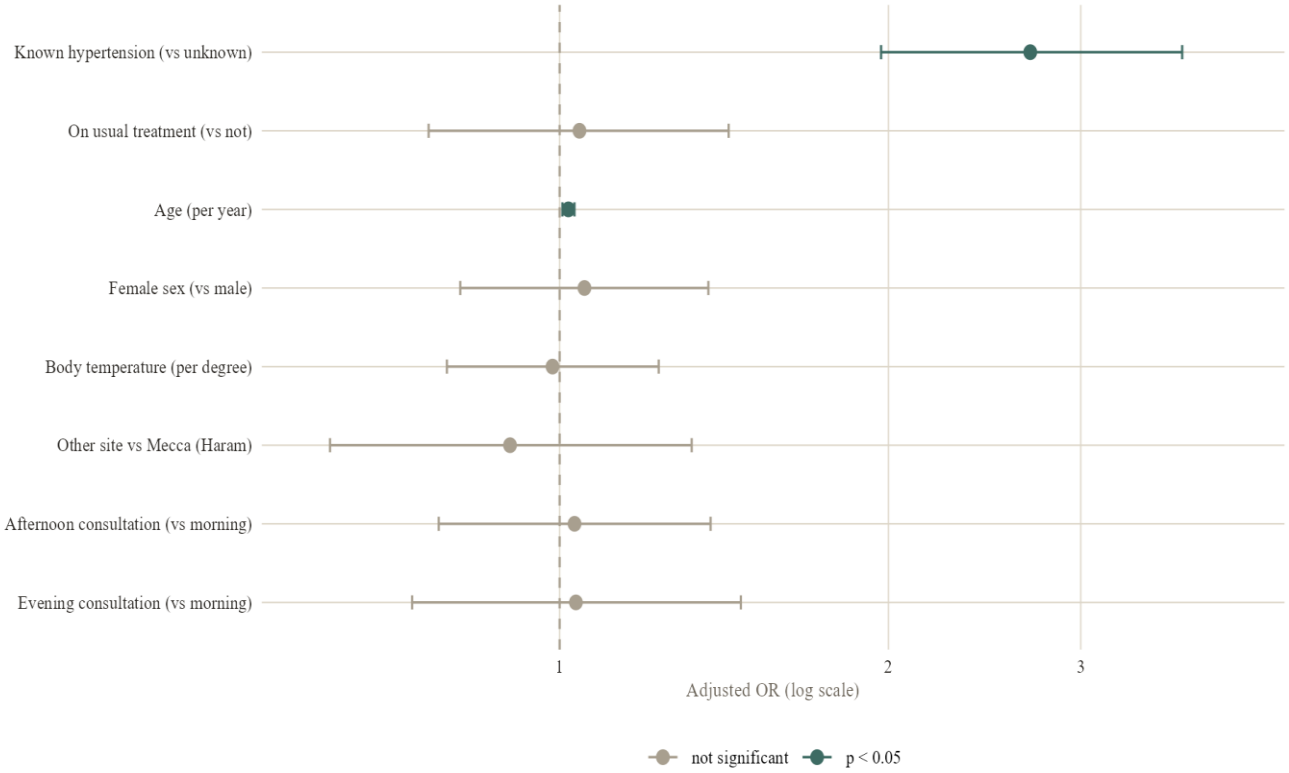

Figure 4. Determinants of abnormal blood pressure -- multivariable logistic regression. Adjusted odds ratios, log scale (n = 1,063 pilgrims).

Table 4. Adjusted ORs abnormal BP vs severe hypertension, same covariates

Variables	Abnormal BP (elevated + severe)	Severe hypertension (crisis)
Known hypertension (vs unknown)	2.70 (1.97-3.72) *	3.66 (2.22-6.10) *
On usual treatment (vs not)	1.04 (0.76-1.43)	0.64 (0.40-1.03)
Age (per year)	1.02 (1.01-1.03) *	1.02 (0.99-1.04)
Female sex (vs male)	1.05 (0.81-1.37)	1.15 (0.76-1.78)
Body temperature	0.99 (0.79-1.23)	0.79 (0.54-1.14)
Other site (vs Mecca)	0.90 (0.62-1.32)	1.07 (0.56-1.93)
Afternoon consultation	1.03 (0.77-1.37)	1.03 (0.65-1.63)
Evening consultation	1.03 (0.73-1.47)	1.10 (0.63-1.86)

** p<0.05. n = 1,063 pilgrims, two multivariable logistic regression models fitted in parallel.*

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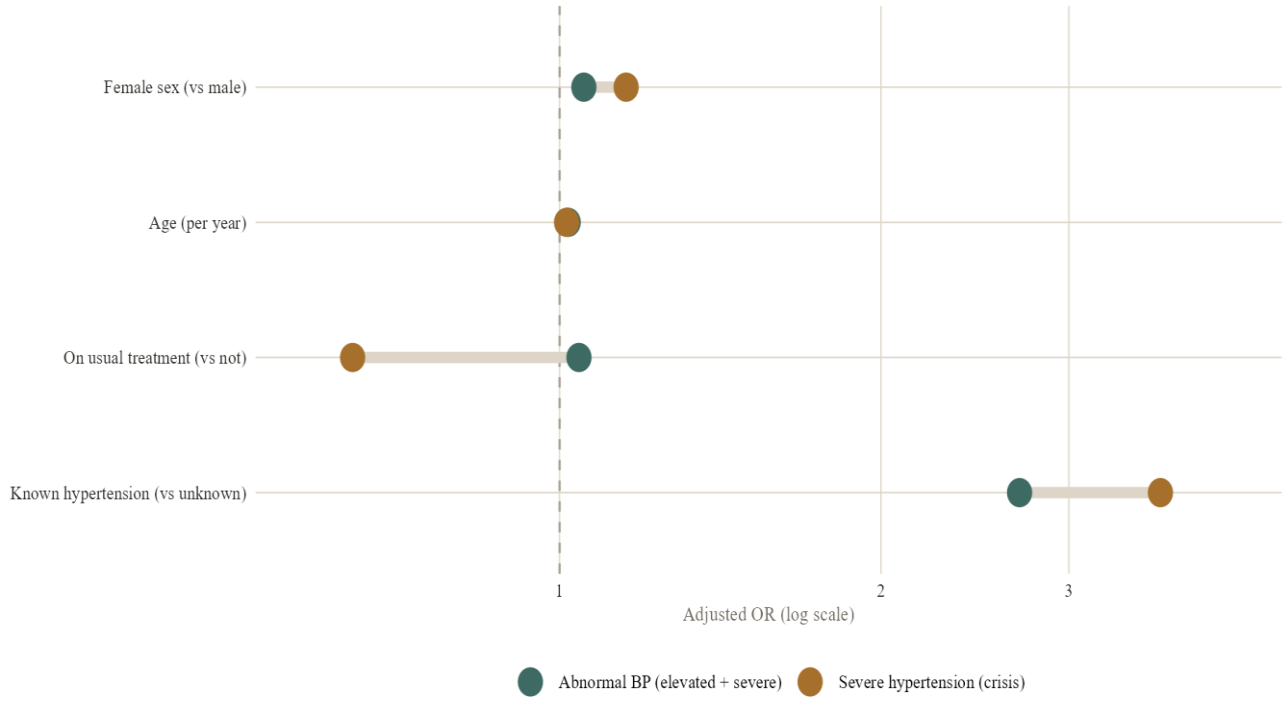

Figure 5. Abnormal blood pressure vs severe hypertension: comparison of adjusted coefficients for four key variables between the two models, log scale.

Known hypertension was more strongly associated with severe hypertension (OR = 3.66, 95% CI 2.22-6.10, p < 0.001) than with abnormal BP taken as a whole (OR = 2.70). Age, however, did not reach the significance threshold for severe hypertension (OR = 1.02, 95% CI 0.99-1.04, p = 0.16), whereas it did for abnormal BP. Reported usual treatment showed a negative association close to the significance threshold for severe hypertension (OR = 0.64, 95% CI 0.40-1.03, p = 0.06), a trend not found for abnormal BP (OR = 1.04).

DISCUSSION

This study provides an estimate of the extent of uncontrolled hypertension and hypertensive crisis among Guinean pilgrims attending consultations. More than one pilgrim in two (57.5%, 95% CI 54.7-60.2) had abnormal blood pressure at the time of consultation, a proportion markedly higher than the pooled prevalence of 12.2% reported for known hypertension among international pilgrims [2], but this gap is largely explained by a difference in definition: our indicator measures elevated blood pressure at the precise moment of consultation, including transient or reactive elevation related to the pilgrimage context, rather than a prevalence of diagnosed hypertension in the general population.

The contrast between pilgrims with already-known hypertension (73.2% abnormal BP) and those without a known history (48.3%) deserves a dual reading. On one hand, it confirms that known hypertension remains, as expected, the determinant most strongly associated with elevated blood pressure during the pilgrimage. On the other hand, and more concerningly, it reveals that a substantial share of pilgrims without a hypertension history -- nearly one in two -- nonetheless had abnormal blood pressure, including 5.8% a severe form, suggesting a non-negligible potential for detecting new cases in this consultation context. The association of abnormal BP with age, also observed in our model, is consistent with the well-documented process of age-related arterial stiffening, which raises systolic blood pressure independently of known hypertensive status [19], while the absence of a significant association with sex is consistent with international data showing a convergence of blood pressure levels between men and women at older ages [20].

The most concerning finding, however, concerns pilgrims already diagnosed: among the 481 pilgrims with known hypertension, 72.1% reported being on usual treatment, and yet 73.2% of them had abnormal BP at the consultation, with reporting treatment not associated with any significant risk reduction in the adjusted model. This finding echoes the blood pressure control levels already reported in the general Guinean population, where only 16.3% of known and treated hypertensive individuals achieved a satisfactory level of control in the STEPS survey [12], and the very high prevalence (61.4%) more recently reported among older Guinean adults [13]. It also converges with findings elsewhere in sub-Saharan Africa of a pooled prevalence of uncontrolled hypertension close to 50% among known hypertensive patients [21], and with the limited medication compliance rates reported specifically among hypertensive pilgrims prior to departure [8].

Several non-exclusive mechanisms could explain this lack of control despite reported treatment: a genuine breakdown in treatment adherence during the stay, already documented among pilgrims with chronic diseases [9]; a physiological blood pressure response to the heat,

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exertion, and dehydration specific to the pilgrimage context -- a context in which heat-related conditions already rank among the leading reasons for seeking care [4,7,22] and where the cardiovascular response to heat stress is known to be impaired in older adults [23], despite generally satisfactory awareness of heat-prevention measures reported among pilgrims [24]; or a report of usual treatment that does not necessarily reflect regular intake at adequate doses at the time of consultation. The available data do not allow these explanations to be distinguished.

This study has several strengths. It is based on a substantial sample of consulting pilgrims with systematic blood pressure measurement, and it offers, to our knowledge for the first time among Guinean pilgrims, an explicit comparison between abnormal blood pressure taken as a whole and hypertensive crisis alone, allowing a determination of whether these two forms share the same determinants -- a question rarely posed in the literature on pilgrim health, which generally treats hypertension as a binary history rather than a graded severity measure [2,3].

Several limitations should nonetheless be highlighted. The cross-sectional design allows only associations to be established, without temporal direction or causal inference. The sample is composed of pilgrims who attended the medical post, rather than a probabilistic sample of all pilgrims in the convoy; symptomatic pilgrims or those already known to be hypertensive are likely overrepresented among consulters, which limits the generalizability of the observed prevalences to all non-consulting pilgrims. Only a single blood pressure measurement was available per pilgrim, with no repetition allowing a transient elevation notably a white-coat effect, a phenomenon documented including in African settings -- to be distinguished from genuinely uncontrolled hypertension [25,26].

The data furthermore contained no information on actual treatment adherence (number of missed doses, interruption during the stay), on the therapeutic class used, or on other potential confounders such as hydration status, salt intake, or pilgrimage-related stress. As the consultation site was very predominantly concentrated in Mecca (86.8%), statistical power to detect a site effect remained limited.

These results should be interpreted in light of the broader context of hypertension in Guinea, where prevalence is already high and therapeutic control insufficient in the general population [12,13]. The fact that this control deficit persists, or even worsens, in the specific and physiologically demanding context of the pilgrimage suggests that simply verifying the existence of a usual treatment before departure is insufficient: a more thorough assessment of actual blood pressure control, combined with therapeutic adjustment where necessary, would benefit from being integrated into the pre-travel medical consultation recommended for pilgrims with chronic diseases [2].

CONCLUSION

More than one consulting pilgrim in two had abnormal blood pressure, and nearly one in ten had a hypertensive crisis. Reported usual treatment was not accompanied by any significant risk reduction, including among pilgrims with already-known hypertension, of whom nearly three-quarters nonetheless remained outside normal blood pressure values. These findings argue for strengthening effective blood pressure control before departure for the pilgrimage, beyond simply verifying the existence of usual treatment, as well as for increased vigilance toward pilgrims without a known history, among whom a non-negligible share of abnormal blood pressure was also observed.

Study Limit

These results come from a sample of consulters at a pilgrimage medical post and are not generalizable either to all non-consulting pilgrims or to other pilgrimage contexts without prior verification. They nonetheless provide a first, quantified and documented estimate of the extent of the problem among Guinean pilgrims, useful for guiding pre-departure medical preparation strategies.

DECLARATIONS

Author's contributions

Drissa Bina Konare (first author): study conception and design, statistical analysis, drafting of the first manuscript.
- Sire Nabe: data management and cleaning, contribution to the statistical analysis, critical revision of the manuscript.
- Aboubacar Sidiki Magassouba: interpretation of results, critical revision of the manuscript's intellectual content.
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Declaration of Conflict of Interest

The authors declare that they have no conflicts of interest in relation to this study.

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Ethics

The research was conducted in accordance with current regulations concerning the ethical principles of the Declaration of Helsinki.

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