

**Kingdom of Saudi Arabia  
Saudi Commission for Health Specialties  
Ministry of Health, Program of Family Medicine, Taif**

**Awareness and adherence of primary health care  
physicians in Taif to Jnc8 guidelines for hypertension  
management, 2018**

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***A research proposal submitted in partial fulfillment of the requirements of  
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## DEDICATION

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**To my parents and my wife for their love  
and support**

*Mohammed Hamed Alosaimi*

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*Before all and foremost I must thank Allah, the great almighty, the most merciful for giving me the patience and capability to complete this study.*

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## **List of abbreviations**

| <b>Abbreviation</b>        | <b>Description</b>  |
|----------------------------|---|
| <b>JNC</b>                 | <b>Joint National Committee on prevention, detection, evaluation and treatment of high blood pressure</b> |
| <b>HTN</b>                 | <b>Hypertension</b>   |
| <b>HEP</b>                 | <b>Hypertension Evaluation Project</b>  |
| <b>PHC</b>                 | <b>Primary health care</b>  |
| <b>GPs</b>                 | <b>General practitioners</b>  |
| <b>KSA</b>                 | <b>Kingdom of Saudi Arabia</b>  |
| <b>SPSS</b>                | <b>Statistical Package for Social Sciences</b>  |
| <b><math>\chi^2</math></b> | <b>Chi Square tests</b>   |

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## ABSTRACT

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**Background:** Inadequate adherence of physicians to clinical practice guidelines has been shown to contribute effectively to poor health outcomes and increased risks with subsequent complications

**Objectives:** To investigate the rate and factors associated with poor adherence to JNC 8 guidelines for management of hypertension.

**Subjects and methods:** A cross-sectional study was carried out in Taif city, March, 2018 including a simple random sample of primary health care physicians working at PHC centers belonging to Ministry of Health (MOH) inside and outside Taif city. A self administered questionnaire was utilized for data collection. It includes three main sections. Section 1 inquired about the socio-demographic characteristics of the physicians, Section 2 inquired about experience with hypertension and JNC 8 and section 3 assessed the adherence of the primary health care physicians regarding JNC 8 guidelines using a valid questionnaire.

**Results:** 183 primary healthcare physicians participated in the study. The age of 44.2% of them ranged between 31 and 40 years whereas that of 27.9% was over 40 years. Males represent about two-thirds of them (68.9%). Majority of the primary healthcare physicians (92.3%) claimed that they are familiar with the JNC8 guidelines. Overall, majority of the

physicians (92.9%) were adherent to the JNC8 in the management of hypertension. Older, more experienced, female physicians, higher educated, and non-Saudis were more likely to adhere to the JNC8 guidelines compared to their counterparts. Familiarity of the physicians with the guidelines, self-reporting of adherence and seeing higher percentage of hypertensive patients to all patients seen were significantly associated with adherence to the JNC8 guidelines.

**Conclusion:** Majority of physicians working at primary health care centers at Taif city expressed adherence to the JNC8 guidelines. Some demographic and practice-related characteristics were identified as determinants of adherence.

# *Chapter 1* **INTRODUCTION**

## INTRODUCTION

### Background

Hypertension (HTN) is a major public health problem, with increasing prevalence on global level.<sup>1</sup> It is the leading risk factors for many cardiovascular diseases and deaths and the largest contributor to the global burden of disease.<sup>2,3</sup>

HTN affects more than a quarter of the adult population worldwide. In 2025, the prevalence of HTN prevalence was increased by 24% in developed countries and 80% in developing countries.<sup>4</sup>

In Saudi Arabia, the prevalence of hypertension among adults was 15.2% and that of borderline hypertension was 40.6%.<sup>5</sup>

Uncontrolled, inappropriately managed as well as undiagnosed HTN is associated with a high risk for morbidity and mortality from mostly preventable complications such as stroke, renal diseases, aneurysm, coronary artery diseases , and peripheral artery diseases.<sup>2, 6,-7</sup>

The proper control of blood pressure leads to reduction in coronary heart disease by about 22 %, <sup>8</sup> and 38% reduction in the stroke incidence <sup>9</sup>.

In 2013, the 8th Joint National Committee report for the management of high BP (JNC 8) was established and provides clinicians with evidence-based recommendations toward management of high blood pressure<sup>7</sup>. The main advantage of the JNC 8 recommendations is that they are based on Randomized Control Trials' evidence, which differs from other available guidelines based on observational studies and expert agreement<sup>10</sup>.

Inadequate adherence of physicians to clinical practice guidelines has been shown to contribute effectively to poor health outcomes and increased risks with subsequent complications <sup>11</sup>. Barriers to effective implementation of recommended guidelines include physicians' lack of familiarity with the guidelines, disagreement with some elements of the guidelines as well as inadequate adherence to guidelines' recommendations <sup>12</sup>.

It has been reported that several primary health care physicians did not compliant with the 7th Joint National Committee (JNC 7)

guidelines of hypertension management <sup>13</sup>. In order to reach to a consistency between the guidelines` recommendations and adequate patient care, physicians must be aware of and adhere to such recommendations <sup>14</sup>.

In the first phase of the Hypertension Evaluation Project (HEP I), the awareness of the recommendations of national HTN guidelines among physicians in Germany was less than 25% <sup>15</sup>. It has been documented that physicians` attitudes toward HTN management and non-adherence to the clinical practice guidelines was responsible for up to more than two thirds of the inadequate control of HTN <sup>16</sup>.

Among numerous identified guidelines, JNC 7 is one of the most popular ones for the management of hypertension <sup>17</sup>. An update of these guidelines (JNC 8) was established in 2014, including evidences providing more accurate measures of quality for the management of hypertensive patients <sup>18</sup>. Despite the fact that effective medications for the control of blood pressure are available, the rate of uncontrolled blood pressure still high worldwide <sup>19</sup>. Therefore, adherence to evidence-based guidelines for management of hypertension is very

important and can leads to substantial better prognosis and lower cost of care for hypertensive patients <sup>20</sup>.

### **Rationale:**

- Despite the existence of many hypertension management guidelines and their regular updating to improve the hypertension control, inadequate adherence to clinical practice guidelines by treating physicians has been documented and proved to be associated with poor health outcomes of hypertension.
- In KSA, limited data is available in this regard and in Taif, no study was cited.
- Primary health care physician's adherence to the hypertension management guidelines constitutes a fundamental step for controlling hypertension. Therefore, knowing the rate of their adherence to hypertension management guidelines and factors associated with poor adherence can assist in a better control of hypertension in KSA.

### **Aim of the study:**

Improving the quality of care delivered to hypertensive patients at primary care settings in Taif by investigating the rate and factors

associated with poor adherence to JNC 8 guidelines for management of hypertension.

### **Specific objectives**

1. To estimate the rate of adherence of primary health care physicians in Taif to JNC 8 guidelines for the management of hypertension, 2018
2. To identify factors associated with non adherence to JNC 8 guidelines for hypertension management among Primary care physicians in Taif, 2018

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# *Chapter 2* ***LITERATURE REVIEW***

## LITERATURE REVIEW

Relatively few studies have been cited regarding this subject with only three studies were carried out in the KSA; one of them inquired about JNC 8. The following is summary of these studies.

### In Saudi Arabia:

In Riyadh (KSA, 2017) <sup>21</sup>, Alshehri et al carried out a cross-sectional study to evaluate the awareness and adherence of family and internal medicine residents, King Saud University to the recommendations of JNC 8 guidelines and to explore associated personal characteristics of the participants. Majority of residents (98%) were aware of the JNC 8 guidelines for the management of hypertension. The overall adherence to all recommendations was (88.1%). There were no significant associations between resident's adherence and all demographic characteristics variables.

Al-Gelban et al (2011)<sup>13</sup> assessed in Aseer region (KSA), the knowledge and adherence of PHC physicians to the recommendations of clinical practice guidelines concerning management hypertensive patients. Only 5.6% of the physicians measured blood pressure with the patient in sitting and other postures. Slightly more than half of the

physicians (56.5%) used variable sphygmomanometer cuff sizes for different patients. Most of them (74.8%) correctly recorded the diastolic BP at Koratkoff sound, phase-5. Among non- diabetics, the correct diagnosis of systolic and diastolic hypertension was reported by 76.7% and 81.4% respectively, of the PHC physicians. Among diabetics, the correct diagnosis of systolic and diastolic hypertension was reported by 36% and 17.1% of the PHC physicians, respectively. Most physicians inquired about cardiovascular risk factors. PHC physicians missed a few investigations and laboratory tests, e.g., ECG (87.9%), serum creatinine (88.2%) and lipid profile (89.8%). Less than one- fifth of the physicians correctly chose the thiazide diuretics as the preferred initial anti-hypertensive agent (19.9%). Almost two- thirds of the physicians (65.2%) emphasized the importance of BP self- measurement, 89.8% encouraged patients to use a reminder system while 96.3% motivated patients for BP control.

In Aljouf (2015)<sup>22</sup>, Alfaleh et al assessed the adherence practices of primary health care physicians to hypertension management guidelines using JNC-7 on hypertension control in Aljouf region. Eighty percent of physicians correctly recorded the blood pressure. The majority of them

(80%) followed JNC-7 guidelines for managing patients with hypertension. Almost all physicians were interested to involve the family in management of hypertensive patients and majority of them (92%) encouraged screening programs for hypertension.

### **Internationally:**

In two major cities in Pakistan (2016) (Islamabad and Rawalpindi)<sup>23</sup>, Malik et al carried out a study to assess the knowledge and perceptions of prescribers regarding adherence to JNC 8 for the treatment of hypertension among physicians. The median score for overall knowledge was 21 with a range of 14 to 28. Almost two-thirds of the participants (69.1 %) reported the absence of standardized guidelines on treatment of hypertension in the health care facilities. They were aware about the correct dosage regimen for captopril (48 %), losartan (60%), atenolol (67.3 %), amlodipine (41.8 %) and hydrochlorothiazide (68.8 %) as according to JNC 8 for initial management of hypertension.

In Nigeria (2017)<sup>24</sup>, Ale and Braimoh assessed awareness of hypertension guidelines among primary-care (PHC) physicians in Nigeria

and its association with hypertension diagnosis and work up. PHC physicians were categorized into two categories; hypertension guideline aware (GA; 46.7%) and guideline unaware (GU; 53.3%). Out of the 19 questions assessed, GA and GU PHC physicians performed better in seven and two questions, respectively, while the two subgroups had a similar performance in 10 questions. The performance of the PHC physicians in government and private practice was similar.

In USA (2015)<sup>25</sup>, a reviewing of electronic medical records was carried out to assess adherence of health care providers to national guidelines for the treatment of hypertension in African Americans. Overall the rate of adherence was 75%. Weight reduction, sodium restriction, and physical activity recommendations were observed on 82.3% of patients` documents. Follow-up was documented in 96.6% of the patients` records with controlled blood pressure and 9.1% in those with uncontrolled blood pressure. Adherence in prescribing ACEIs in patients with a co-morbidity of DM was documented in 70% of participants.

In Sweden, Ekesbo et al<sup>26</sup> carried out a study to measure adhere of GPs to clinical guidelines for the treatment of hypertension. Generally,

GPs focused on the blood pressure itself rather than assessing the cardiovascular risk factor profile. Therefore, patients with the highest risk of cardiovascular disease were not treated accordingly. Also, there was over treatment of the lowest risk individuals. Furthermore, the BP levels for initiating pharmacological treatment varied widely (systolic BP 140-210 mmHg).

Jorgensen (2015)<sup>27</sup> published a literature review aimed to assess physicians' adherence to evidence-based practice guidelines in the management of hypertension in women. They revealed that physicians were not adhering to evidence-based practice guidelines, which may be one possible explanation for poor blood pressure control. Also, they reported that there is a number of physicians were unfamiliar with the JNC guidelines.

# *Chapter 3* **METHODOLOGY**

## **METHODOLOGY**

### **Study design:**

Cross-sectional study

### **Study place:**

The study was carried out in Taif city which is located in the West of Saudi Arabia. The estimated population is 1,281,613 according to 2011 census<sup>28</sup>. In Taif, there are 121 PHC centers belonging to Ministry of health; 19 inside Taif city and 102 outside Taif city. They included all 350 physicians. This study was conducted in a random sample of these primary health care centers.

### **Study population**

Primary health care physicians working at PHC centers belonging to Ministry of Health (MOH) inside and outside Taif city constituted the target population of the study.

### **Study period:**

The study was conducted throughout the period January-March, 2018.



### **Sample size/technique**

The required sample size was estimated using the online sample size calculator. Assuming that the margins of error as 5%, at 95% confidence level, the required sample size out of 350 physicians was 183 physicians (52.3%). Simple random technique was adapted to select PHC centers and invite all physicians in the selected till the required sample size was reached.

### **Study tool**

A self administered questionnaire was utilized for data collection. It includes three main sections. Section 1 inquires about the socio-demographic characteristics of the physicians: age, gender, nationality, working sector, educational level, and experience in PHC practice. Section 2 inquires about experience with hypertension and JNC 8 (familiarity, to what extent the physicians use these guidelines in their practice, average number of hypertensive patients seen per week, and percentage of hypertensive patients among all patients see). The third section assesses the adherence of the primary health care physicians regarding JNC 8 guidelines using a valid questionnaire previously utilized in a study carried out in Riyadh, Saudi Arabia<sup>21</sup>. As JNC 8 has nine

recommendations regarding the management of hypertension and since recommendation number 9 is very long, it has been divided into two recommendations, which makes a total of 10 recommendations in this study.

### **Pilot study:**

It was done among 20 physicians to test understanding of the research questions and estimate the time needed to complete it. Their results were included in the final report as there was no much difference from the main results.

### **Data collection technique:**

The researcher distributed and collected the data by himself and was available during the distribution of the questionnaire for any clarification. Filled questionnaire were collected in the same day. Care was taken to not disturb the physicians` working time.

### **Data entry and analysis:**

The data were collected and verified by hand then coded before entry. Statistical Package for Social Sciences (SPSS) software version 22.0 was used for data entry and analysis. Descriptive statistics (e.g. number,

percentage, standard deviation, arithmetic mean) and analytic statistics using chi-square test ( $\chi^2$ ) were applied for comparisons. P-value less than 0.05 was considered statistically significant.

Physicians were classified into two different groups; group of unawareness of the guidelines, if they answered “no” on the question on familiarity with the guideline and group of awareness of the guidelines, if they answered “yes” on the question on familiarity. For adherence, they were considered to adhere to the recommendations when they “always” or “most of the time” applied the guidelines in their clinical practice. On a likert scale, a score of “0” was given to never, “1” to rarely, “2” to sometimes, “3” to most of the time and “4” for always. The overall adherence to all recommendations, total score was computed. Physicians who scored  $\leq 20$  were considered non-adherent, whereas those who scored over 20 were considered adherent.

### **Administrative and ethical consideration**

All the required official approvals were fulfilled (from the regional Research and Ethical Committee in Taif, from director of PHC, MOH in Taif as well as from the source of our questionnaire). All participants were briefed by the researcher about the objectives of this study. They

were assured that this is not an exam to encourage them to participate in this study. They were also assured about the anonymity and full confidentiality of their responses. Their verbal consents to participate were requested.

### **Budget**

This study was totally self-funded

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# *Chapter 4* **RESULTS**

## RESULTS

### **-Demographic characteristics:**

Table 1 presents the demographic characteristics of 183 primary healthcare physicians participated in the study. The age of 44.2% of the participants ranged between 31 and 40 years whereas that of 27.9% was over 40 years. Males represent about two-thirds of them (68.9%). Also about two-thirds were non Saudis (68.3%) and 62.3% were MBBS holders while 13.7% of the physicians were family medicine Board certified. The experience of almost one-third of the primary care physicians (32.8) was in the group from 6 and 10 years while 15.3% were in the group exceeded 15 years.

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**Table 1: Demographic characteristic of the primary healthcare physicians, Ministry of health, Taif (n=183)**

|                                  | <b>Number</b> | <b>Percentage</b> |
|----------------------------------|---------------|-------------------|
| <b>Age (years)</b>               |               |                   |
| 25-30                            | 51            | 27.9              |
| 31-40                            | 81            | 44.2              |
| >40                              | 51            | 27.9              |
| <b>Gender</b>                    |               |                   |
| Male                             | 126           | 68.9              |
| Female                           | 57            | 31.1              |
| <b>Nationality</b>               |               |                   |
| Saudi                            | 58            | 31.7              |
| Non-Saudi                        | 125           | 68.3              |
| <b>Educational level</b>         |               |                   |
| MBBS                             | 115           | 62.8              |
| Diploma                          | 24            | 13.1              |
| Master                           | 19            | 10.4              |
| FM Board                         | 25            | 13.7              |
| <b>Experience at PHC (years)</b> |               |                   |
|                                  | 20            | 10.9              |
| 1                                | 55            | 30.1              |
| 2-5                              | 60            | 32.8              |
| 6-10                             | 20            | 10.9              |
| 11-15                            | 28            | 15.3              |
| >15                              |               |                   |

**Hypertension practice-related characteristics:**

### **-Awareness and familiarity of the participants with JNC8 guidelines**

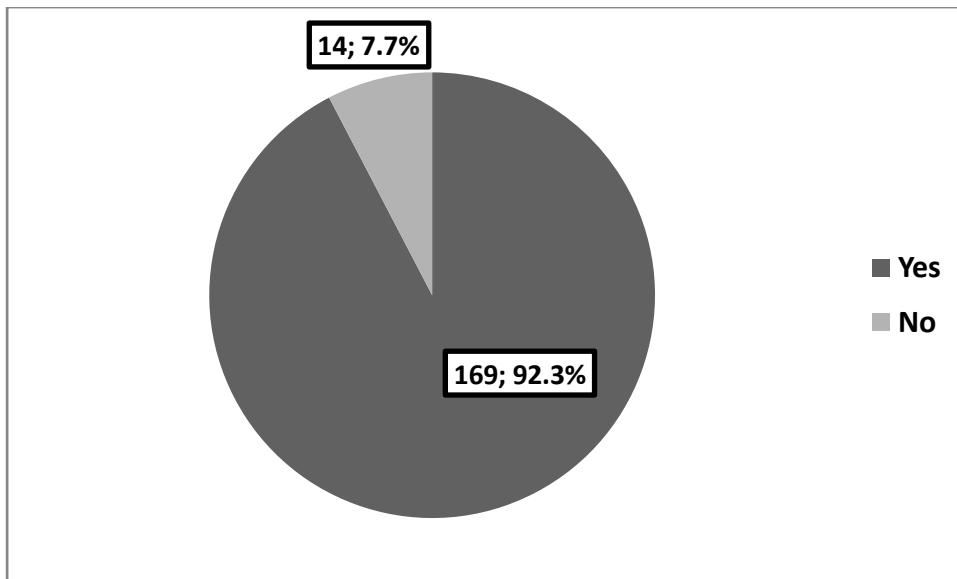
It is shown in figure 1 that the majority of the primary healthcare physicians (92.3%) claimed that they are familiar with the JNC8 guidelines

More than half of the physicians (53.6%) reported that they are following JNC8 guidelines most of time while 15.3% claimed that they are following these guidelines all the time. On the other hand, only 2.7% of them followed these guidelines rarely or not at all. Figure 2

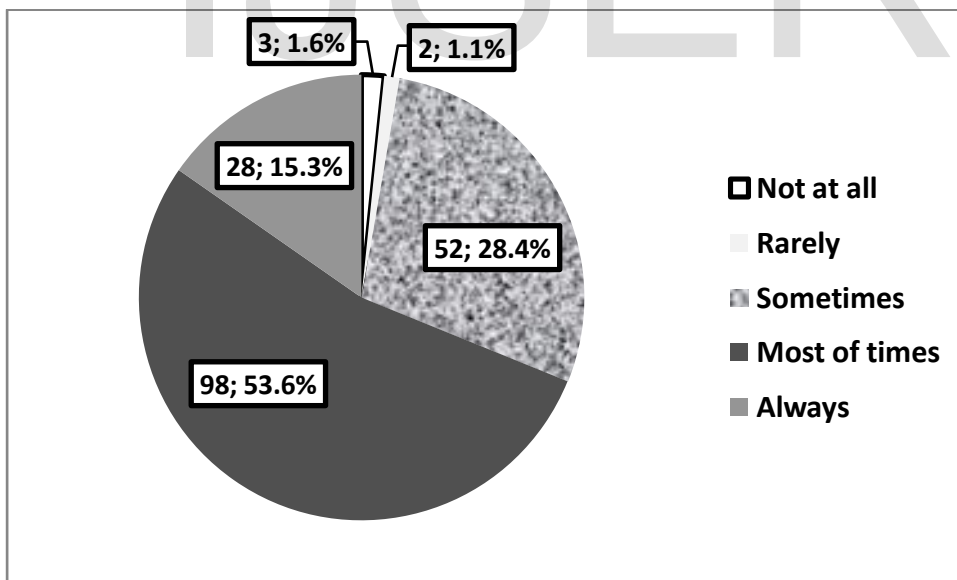
Approximately one-third of the physicians (31.7%) have seen between 11 and 20 hypertensive patients on the average per week whereas 13.7% of them have seen more than 30 hypertensive patients per week as illustrated in figure 3.

The percentage of hypertensive patients to all patients seen by primary healthcare physicians was 10 or less among 59.5% of the physicians while it exceeded 20% among 9.3% of them as clear from figure 4.

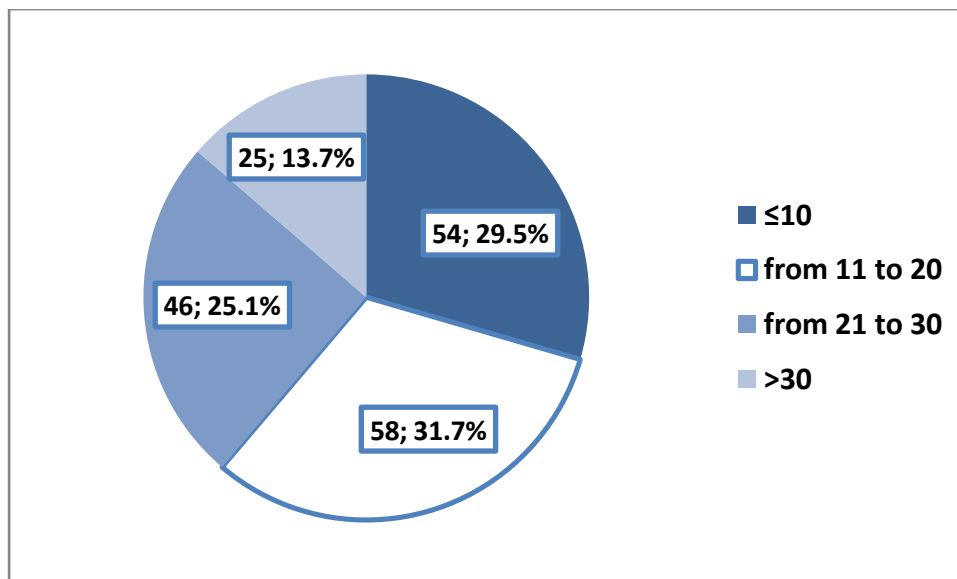




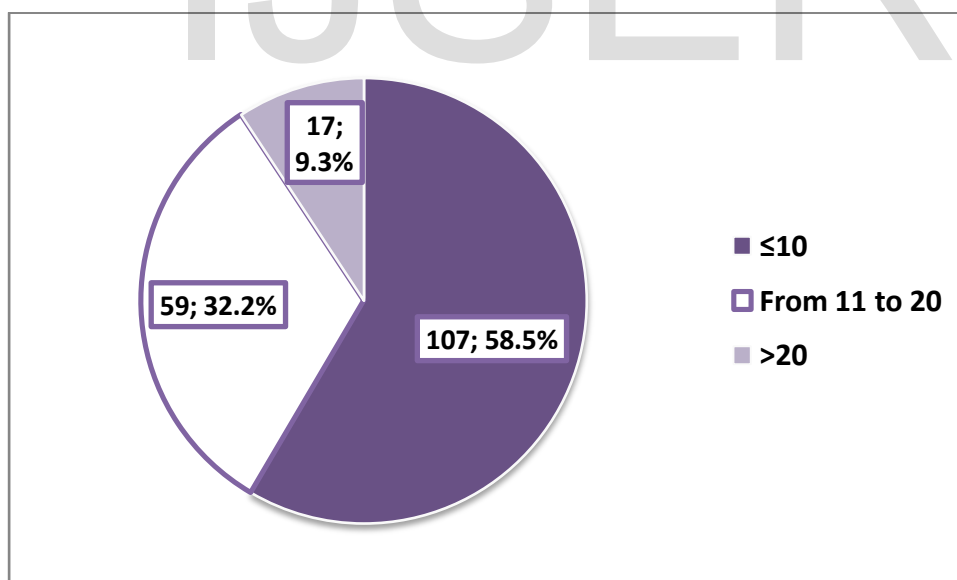
**Figure 1: Familiarity of the primary healthcare physicians, Ministry of Health in Taif with JNC8 guidelines**



**Figure 2: Frequency of following JNC8 guideline among the primary healthcare physicians, Ministry of Health in Taif**



**Figure 3: Average number of hypertensive patients seen per week by primary healthcare physicians, Ministry of Health, Taif.**



**Figure 4: Percentage of hypertensive patients to all patients seen by primary healthcare physicians, Ministry of Health, Taif.**

### Adherence to JCN8 guideline in the management of hypertension

Table 2 summarizes the responses of the primary healthcare physicians regarding the adherence to JCN8 guideline in the management of hypertension. Most of the primary health care physicians either always or most of the time initiate pharmacologic treatment in the general population aged  $\geq 60$  years, to lower blood pressure (BP) at systolic blood pressure (SBP)  $\geq 150$  mmHg or diastolic blood pressure (DBP)  $\geq 90$  mmHg and treat to a goal SBP  $<150$  mmHg and goal DBP  $< 90$  mmHg (82.5%), initiate pharmacologic treatment in the general population  $<60$  years to lower BP at DBP  $\geq 90$  mmHg and treat to reach a goal of DBP  $< 90$  mmHg (83.6%), initiate pharmacologic treatment in the general population  $< 60$  years, to lower BP at SBP  $\geq 140$  mmHg and treat to a goal SBP  $< 140$  mmHg (84.7%), initiate pharmacologic treatment in the population aged  $\geq 18$  y with Chronic Kidney Disease (CKD), to lower BP at SBP  $\geq 140$  mmHg or DBP  $\geq 90$  mmHg and treat to goal mmHg and goal DBP  $<90$  mmHg. SBP  $<140$  (86.9%), initiate pharmacologic treatment in the population aged  $\geq 18$  y with diabetes to lower BP at SBP  $\geq 140$  mmHg or DBP  $\geq 90$  mmHg and treat to a goal SBP  $< 140$  mmHg and goal DBP  $< 90$  mmHg. (84.7%), initiate antihypertensive treatment in the general nonblack population, including those with diabetes, which should include a thiazide-type

diuretic, CCB, ACEI, or ARB (78.2%), initiate antihypertensive treatment in the general black population, including those with diabetes, which should include a thiazide-type diuretic or CCB (77.7%), initiate (or add-on) antihypertensive treatment in the population aged  $\geq 18$  y with CKD, which should include an ACEI or ARB to improve kidney outcomes and this applies to all CKD hypertension regardless of race or diabetes status (81.4%), increase the dose of the initial drug or add a second drug from one of the classes (thiazide-type diuretic, CCB, ACEI, or ARB), if goal BP is not reached within a month of treatment (83.6%) and majority of them (91.9%) adding and titrating a third drug from the list provided, if goal BP cannot be reached with 2 drugs and do not use an ACEI and an ARB together in the same patient.

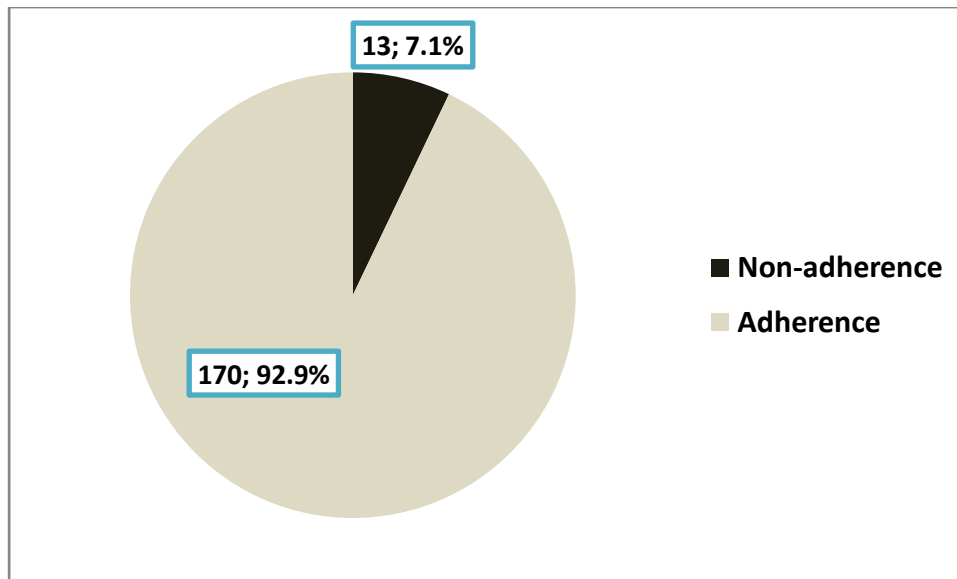
Overall, majority of the physicians (92.9%) were adherent to the JCN8 in the management of hypertension as clear from figure 5.

**Table 2: Responses of the physicians to different guideline in the management of hypertension**

|  | Never      | Rarely      | Sometimes    | Most of the time | Always       |
|--|------------|-------------|--------------|------------------|--------------|
|  | 0          | 1           | 2            | 3                | 4            |
|  | N (%)      | N (%)       | N (%)        | N (%)            | N (%)        |
| In the general population aged ≥ 60 years, initiate pharmacologic treatment to lower blood pressure (BP) at systolic blood pressure (SBP) ≥ 150 mmHg or diastolic blood pressure (DBP) ≥ 90 mmHg and treat to a goal SBP <150 mmHg and goal DBP < 90 mmHg. | 0<br>(0.0) | 14<br>(7.7) | 18<br>(9.8)  | 78<br>(42.6)     | 73<br>(39.9) |
| In the general population <60 years, initiate pharmacologic treatment to lower BP at DBP ≥ 90 mmHg and treat to a goal DBP < 90 mmHg   | 0<br>(0.0) | 4<br>(2.2)  | 26<br>(14.2) | 85<br>(46.4)     | 68<br>(37.2) |
| In the general population < 60 years, initiate pharmacologic treatment to lower BP at SBP ≥ 140 mmHg and treat to a goal SBP < 140 mmHg.   | 0<br>(0.0) | 5<br>(2.7)  | 23<br>(12.6) | 78<br>(42.6)     | 77<br>(42.1) |
| In the population aged ≥ 18 y with Chronic Kidney Disease (CKD), initiate pharmacologic treatment to lower BP at SBP ≥ 140 mmHg or DBP ≥ 90 mmHg and treat to goal mmHg and goal DBP <90 mmHg. SBP <140  | 6<br>(3.3) | 3<br>(1.6)  | 15<br>(8.2)  | 83<br>(45.4)     | 76<br>(41.5) |
| In the population aged ≥ 18 y with diabetes, initiate pharmacologic treatment to lower BP at SBP ≥ 140 mmHg or DBP ≥ 90 mmHg and treat to a goal SBP < 140 mmHg and goal DBP < 90 mmHg.  | 4<br>(2.2) | 7<br>(3.8)  | 17<br>(9.3)  | 65<br>(35.5)     | 90<br>(49.2) |
| In the general nonblack population, including those with diabetes, initial antihypertensive treatment should include a thiazide-type diuretic, CCB, ACEI, or ARB.  | 2<br>(1.1) | 5<br>(2.7)  | 33<br>(18.0) | 72<br>(39.3)     | 71<br>(38.9) |
| In the general black population, including those with diabetes, initial antihypertensive treatment should include a thiazide-type diuretic or CCB.   | 3<br>(1.6) | 3<br>(1.6)  | 35<br>(19.1) | 83<br>(45.5)     | 59<br>(32.2) |
| In the population aged ≥ 18 y with   | 6          | 7           | 21           | 79               | 70           |

|   |            |            |              |              |              |
|---|------------|------------|--------------|--------------|--------------|
| CKD, initial (or add-on) antihypertensive treatment should include an ACEI or ARB to improve kidney outcomes. This applies to all CKD hypertension regardless of race or diabetes status. | (3.3)      | (3.8)      | (11.5)       | (43.1)       | (38.3)       |
| If goal BP is not reached within a month of treatment, increase the dose of the initial drug or add a second drug from one of the classes (thiazide-type diuretic, CCB, ACEI, or ARB).    | 8<br>(4.4) | 0<br>(0.0) | 22<br>(12.0) | 83<br>(45.3) | 70<br>(38.3) |
| If goal BP cannot be reached with 2 drugs, add and titrate a third drug from the list provided. Do not use an ACEI and an ARB together in the same patient.                               | 3<br>(1.6) | 1<br>(0.5) | 11<br>(6.0)  | 78<br>(42.6) | 90<br>(49.3) |

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**Figure 5: Adherence of the primary healthcare physicians in Taif city to JNC 8 guidelines in the management of hypertension**

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## **Factors associated with adherence to JNC8 guidelines**

### **-Demographic factors:**

It is evident from table 3 that all physicians aged over 40 years compared to 78.4% of those aged between 25 and 30 years adhered to the JNC8 guideline. This difference was statistically significant,  $p < 0.001$ . All female physicians compared to 89.7% of males adhered to the JNC8 guidelines,  $p = 0.006$ . Majority of non-Saudi physicians (98.4%) compared to 81% of Saudis adhered to the JNC8 guidelines,  $p < 0.001$ . All master or family Medicine Board holders compared to 89.6% of physicians with only MBBS adhered to JNC guidelines,  $p = 0.023$ . All physicians with an experience of more than 10 years in primary health care compared to 85% of those with an experience of one year in PHC adhered to JNC8 guidelines,  $p = 0.011$ .



**Table 3: Demographic factors associated with adherence to JNC 8 guidelines for the management of hypertension among primary healthcare physicians, Taif city.**

|                                  | Adherence to JNC 8 guidelines |            | p-value  |
|----------------------------------|-------------------------------|------------|----------|
|                                  | Non-adherence                 | Adherence  |          |
|                                  | N=13                          | N=170      |          |
|                                  | N (%)                         | N (%)      |          |
| <b>Age (years)</b>               |                               |            |          |
| 25-30 (n=51)                     | 11 (21.6)                     | 40 (78.4)  |          |
| 31-40 (n=81)                     | 2 (2.5)                       | 79 (97.5)  |          |
| >40 (n=51)                       | 0 (0.0)                       | 51 (100)   | <0.001*  |
| <b>Gender</b>                    |                               |            |          |
| Male (n=126)                     | 13 (10.3)                     | 113 (89.7) |          |
| Female (n=57)                    | 0 (0.0)                       | 57 (100)   | 0.006**  |
| <b>Nationality</b>               |                               |            |          |
| Saudi (n=58)                     | 11 (19.0)                     | 47 (81.0)  |          |
| Non-Saudi (n=125)                | 2 (1.6)                       | 123 (98.4) | <0.001** |
| <b>Educational level</b>         |                               |            |          |
| MBBS (n=115)                     | 12 (10.4)                     | 103 (89.6) |          |
| Diploma (n=24)                   | 1 (4.2)                       | 23 (95.8)  |          |
| Master (n=19)                    | 0 (0.0)                       | 19 (100)   |          |
| FM Board (n=25)                  | 0 (0.0)                       | 25 (100)   | 0.023*   |
| <b>Experience at PHC (years)</b> |                               |            |          |
| 1 (n=20)                         | 3 (15.0)                      | 17 (85.0)  |          |
| 2-5 (n=55)                       | 6 (10.9)                      | 49 (89.1)  |          |
| 6-10 (n=60)                      | 4 (6.7)                       | 56 (93.3)  |          |
| 11-15 (n=20)                     | 0 (0.0)                       | 20 (100)   |          |
| >15 (n=28)                       | 0 (0.0)                       | 28 (100)   | 0.011*   |

\* Chi-square for trend

\*\* Fischer Exact test

**-Practice-related factors:**

Physicians who claimed familiarity with JNC8 guidelines were more likely to adhere to the guideline than others (94.1% versus 78.6%). However, this difference didn't reach a statistically significant level,  $p=0.065$ . All physicians who self-reported always adherence to the JNC8 guidelines compared to 33.3% of those who reported no adherence at all expressed adherence to the JNC8 guidelines,  $p<0.001$ . All physicians who reported that the percentage of hypertensive patients to all patients seen ranged between 11-20% compared to 88.8% of those who reported a percentage of 10% or lower adhered to the JNC8 guidelines,  $p=0.045$ . Average number of hypertensive patients seen/week was not significantly associated with adherence to the JNC8 guidelines. Table 4

**Table 4: Practice-related factors associated with adherence to JNC 8 guidelines for the management of hypertension among primary healthcare physicians, Taif city.**

|   | Adherence to JNC 8 guidelines  |                             | p-value  |
|---|--------------------------------|-----------------------------|----------|
|   | Non-adherence<br>N=13<br>N (%) | Adherence<br>N=170<br>N (%) |          |
| <b>Familiarity with JNC8 guidelines</b>                         |                                |                             |          |
| Yes (n=169)   | 10 (5.9)                       | 159 (94.1)                  | 0.065**  |
| No (n=14)   | 3 (21.4)                       | 11 (78.6)                   |          |
| <b>Frequency of following JCN8 guideline generally</b>          |                                |                             |          |
| Not at all (n=3)  | 2 (66.7)                       | 1 (33.3)                    | <0.001** |
| Rarely (n=2)  | 1 (50.0)                       | 1 (50.0)                    |          |
| Sometimes (n=52)  | 9 (17.3)                       | 43 (82.7)                   |          |
| Most of the time (n=98)   | 1 (1.0)                        | 97 (99.0)                   |          |
| Always (n=28)   | 0 (0.0)                        | 28 (100)                    |          |
| <b>Average number of hypertensive patients seen/week</b>        |                                |                             |          |
| ≤10 (n=54)  | 6 (11.1)                       | 48 (88.9)                   | 0.577*   |
| 11-20 (n=58)  | 2 (3.4)                        | 56 (96.6)                   |          |
| 21-30 (n=46)  | 3 (6.5)                        | 43 (93.5)                   |          |
| >30 (n=25)  | 2 (8.0)                        | 23 (92.0)                   |          |
| <b>Percentage of hypertensive patients to all patients seen</b> |                                |                             |          |
| ≤10 (n=107)   | 12 (11.2)                      | 95 (88.8)                   | 0.045*   |
| 11-20 (n=59)  | 0 (0.0)                        | 59 (100)                    |          |
| >20 (n=17)  | 1 (5.9)                        | 16 (94.1)                   |          |

\* Chi-square for trend

\*\* Fischer Exact test

# *Chapter 5* *DISCUSSION*

## DISCUSSION

Many guidelines exist worldwide for the screening, diagnosis, and management and control of hypertension. All these guidelines are largely based on achieving almost the same goals and are close to each others in their effectiveness regarding to the outcomes<sup>29</sup>. Only, minor discrepancies in some areas have been observed between various guidelines particularly regarding the ranges of target blood pressure in elderly<sup>19</sup>. The present study aimed to investigate the adherence of primary health care, Ministry of health in Taif, Saudi Arabia to one of the most popular guidelines for the treatment of hypertension (JNC 7) issued by the National High Blood Pressure Education Program, which was updated as JNC 8 in 2014<sup>7</sup>.

Few studies were carried out to investigate the adherence of physicians to the JNC8 guidelines as most of the published articles investigated adherence to older version of JNC or even other guidelines. In the current study, the majority of primary healthcare physicians was familiar with the JNC8 guidelines (92.3%) and adhered to them (92.9%). The high familiarity of the primary healthcare physicians to the guidelines in the current study could be due to the dissemination of the

guidelines by the Ministry of Health to the physicians as well as to the high prevalence of hypertension that makes the physicians more familiar with the recent guidelines' recommendations and the fact that primary care physicians have more opportunities to manage hypertensive patients in their clinics.

Higher rates of familiarity and adherence regarding JNC8 guidelines were also reported by others. In a study carried out in Riyadh (KSA, 2017),<sup>21</sup> among family and internal medicine residents, the majority of residents (98.2%) were aware of the JNC 8 guidelines for the management of hypertension and the overall adherence to all recommendations was (88.1%). In Pakistan (2016),<sup>23</sup> The median knowledge score of physicians regarding JNC8 guidelines was 21 (range was 14 to 28). High rates of awareness and adherence of the physicians regarding other guidelines for the management of hypertension are reported elsewhere<sup>30-32</sup>. However, in Kuwait most family physicians did not completely adhere to all hypertension guidelines<sup>33</sup>. In Saudi Arabia, primary care physicians in Aseer Region did not completely adhere to all JNC 7 hypertension guidelines (17.7%) as reported by Al-Gelban et al<sup>13</sup>. In Nigeria (2017)<sup>24</sup>, lower rate of hypertension guideline awareness

was reported among primary care physicians (46.7%) with no difference between government and private practice physicians. In South Africa, the rate of adherence among the general practitioners to the JNC 6 hypertension guidelines was suboptimal (73.5%)<sup>34</sup>. They attributed the relatively low adherence to hypertension management guidelines to the lack of time for physicians to read and remember all details of all guidelines, especially with the availability of many guidelines and the big volume of their recommendations<sup>35</sup>.

In the present study, adherence to JNC8 guidelines for hypertension management was higher among older, more experienced and more educated physicians. Also, it was higher among female and non-Saudi physicians. In another study carried out in Riyadh among resident physicians,<sup>21</sup> none of the demographic factors was associated with adherence to JNC8 guidelines.

It had been reported that applying the practical application of the recommendations of guidelines may be impossible in different clinical settings due to deficiency of local resources, inadequate consultation time, or the absence of attention to the logistics of implementation<sup>35, 36</sup>.

In the present study, physicians who have seen higher percentage of hypertensive patients relative to total patients seen expressed higher adherence to guidelines rate. The same has been reported by others<sup>34</sup>.

Among important limitations of the present study was the self-administered nature of the response to the questionnaire as physicians usually overestimate their adherence to hypertension guidelines. In the present study, we did not investigate the potential barriers for non-adherence to the JNC8 guidelines' recommendations among primary health care physicians. Most studies reported that among barriers are the disagreement of physicians with some of the recommendations, the absence of motivation, resistance to change the management strategy, a high number of patients seen, a lack of outcome expectancy, and inadequate consultation time<sup>13, 26, 34, 35</sup>. Despite those limitations, the sample chosen in the present study represent more than half of primary healthcare physicians, Ministry of health in Taif. However, further study is recommended to include primary healthcare physicians from other locations in the Saudi Arabia to have a more comprehensive view of the situation.



# *Chapter 6* **CONCLUSION**

## **Conclusion**

Majority of physicians working at primary health care centers at Taif city expressed high rate of adherence to the JNC8 guidelines. Older, more experienced, female physicians, higher educated, and non-Saudis were more likely to adhere to the JNC8 guidelines compared to their counterparts. Familiarity of the physicians with the guidelines, self-reporting of adherence and seeing higher percentage of hypertensive patients to all patients seen were significantly associated with adherence to the JNC8 guidelines.

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# *Chapter 7* **RECOMMENDATIONS**

## Recommendations

1. More training programs to improve knowledge and awareness about the JNC8 treatment guidelines for hypertension among primary health care physicians is needed, particularly for young, male and Saudi physicians.
2. Further analysis of the possible barriers for some suboptimal adhered recommendations is needed.
3. Also, further studies are recommended to assess primary health care physicians from different disciplines, other than Ministry of Health, regarding awareness and adherence to the JNC 8 guidelines.
4. Distributing the JNC8 guidelines to primary healthcare physicians and organizing a workshop or conference at the level of primary health care to discuss its contents with physicians by experts.

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# IJSER *APPENDICES*

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