Prevalence, Risk Factors, Control and Treatment Adherence of Hypertension: A Community-Based Study In An Egyptian Village

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Abstract

Background: Hypertension is common in developing countries and most of its risk factors are preventable. **Objective:** This study aims to estimate the prevalence and risk factors of hypertension among rural adults in an Egyptian village. **Method:** a nested case-control study was carried out in Meet El-Amel village, Aga District, Dakahlia Governorate it was targeting adult subjects aged from 18 years and more, pregnant and lactating women were excluded. The mean age of participants was 44.6±15.9 years. **Results:** the overall prevalence of hypertension was 31.9%. Multivariate logistic regression model has identified that being a woman (AOR= 46.5), being adherent to drug therapy (AOR= 40.3) and secondary or higher education levels (AOR= 14.8) as the only predictors for controlled hypertension among self-reported hypertensive. Excess salt (AOR= 17.5), smokers (AOR=5.8), obesity (AOR=5.1), high cholesterol (AOR=4.8), those belonging to 40-59 age group (AOR=3.5), low HDL (3.2), positive family history of hypertension (AOR= 3.1), physical inactivity (AOR= 2.9), those ≥ 60 years old (AOR=2.8) and men gender (AOR=2.3) are predictors of newly discovered hypertension. **Conclusion:** primary prevention of modifiable risk factors of hypertension is crucial.

Key words: *Hypertension, Prevalence, Risk factors, Treatment adherence, Control*

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Introduction

Hypertension is a common non-communicable disease. It poses a huge threat on the development of many other diseases especially cardiovascular and stroke.[1] Globally, around 51% of stroke and 45% of ischemic heart disease deaths are attributable to high systolic blood pressure.[2] According to the global burden of disease study 2010, the prevalence of hypertension is high in both economically developed and developing countries.[3] Consequently, the World Health Organization aimed to decrease its prevalence by 25%.[4]

Some studies illustrated upsetting levels of hypertension among adults in the Middle East. This could be attributed to the higher prevalence of its risk factors.[5] Although hypertension is common in developing countries like Egypt particularly in urban areas, the rate of awareness and management is very low.[6] Unfortunately it is not wholly addressed in terms of undiagnosed and uncontrolled cases.[7]

Despite the wealth of information available from the national and local studies, there is a lack of knowledge about hypertension in the rural areas of Dakahlia governorate. These areas witnessed dramatic changes in the socio-cultural, dietary and behavioral characteristics of rural population. These changes are associated with increase in the morbidity and mortality of non-communicable diseases in general and hypertension in particular. This study aims to estimate the prevalence, control and treatment adherence of hypertension as well as their

associated factors among rural adults in an Egyptian village.

Method

This is a nested case-control study (a cross-section study followed by a case-control study: newly diagnosed hypertensive vs. normotensive) carried out in Meet Al-Amel village, Aga District, Dakahlia Governorate**,** Egypt. The village is 23.58 Km. North of Mansoura City with a total population about 30 thousands distributed in about7200 nuclear families. Adults represent about 55% of the population. It is a traditional conservative community and agriculture is the most common activity of the population. The study was done from June the first to August 31, 2017. The target population is adult subjects (18 years and older) residing in the village for at least one year, pregnant and lactating women were excluded.

Sample size was calculated using MedCalc program. A previous study in Egypt showed the prevalence of hypertension in adults as 26.7%. [8] Considering 5% alpha error, study power of 80% and 5% precision; the sample size is 558. In order to recompense for non-responders, 10% was added. Thus the final sample size is 614. A total of 250 families were nominated by systematic random sample (every 36 file) from family files kept at Family Health Unit. All adult family members were selected. A total of 643 were requested to participate in the study and 602 subjects completed the questionnaire (response rate 93.6%). The non-responders were either refused to participate or not available at their homes during data collection day (4.5% and 1.9%; respectively).

Participants attended the Family Health Unit, in a fasting state, on a previously agreed time and day as arranged by nurses working at the local health center. Data were collected about the social status of the family and the participant, family history and medical history of chronic diseases. Blood pressure was measured for all participants. The following tools were completed for normotensive and newly diagnosed hypertensive: dietary habits, physical activity, smoking history, weight and height, and blood samples were drawn for lipogram. Known hypertensive was asked about type of treatment, number of drugs taken and treatment adherence.

The socio-economic status was assessed using the socioeconomic scale[9] including level of education and work, sources and income sufficiency, household possessions and housing conditions. The socioeconomic level was defined based on the quartiles as a cut off points.

Dietary habits were measured using the Arabic version of The Mediterranean Dietary Serving Score (MDSS).[10] The Arabic version was developed after agreement regarding any controversies between the translated drafts made by two independent researchers. Then it was backward translated in English by other two independent translators totally non-informed about the original version and a consensus was made regarding any discrepancies. The validity of the content was assessed by a jury of 10 public health experts and the index ranged from 0.71-0.93 for different items. The Arabic questionnaire was tested on 20 persons excluded from the full-scale study as a pilot. Cronbach's alpha of internal consistency was 0.79. MDSS is based on the latest update of the Mediterranean Diet Pyramid[11] calculating the rates of consumption of different food items and food groups. Individual within the recommended number of servings are scored 1, 2, or 3 points for recommendations expressed as times/week, times/day or times/meal; respectively. In adults, 2 and 1 glasses of wine or beer (fermented drinks) for males and females; respectively add 1 point.

When the number of servings/meal, day, or week is higher or lower than the

Table (1): Overall Prevalence of Hypertension in Meet Al-Amel Village

Categories			SBP&/orDBP*	N (%)
Normotensive			<140&/or <90	410 (68.1)
Hypertensive (HTN)	**Total**			192 (31.9)
	Self-reported HTN	**Total**		74 (12.3)
		Controlled	<140&/or <90	35 (47.3) #
		Treatment adherence		23 (31.1) #
	Newly diagnosed HTN	**Total**	≥140&/or ≥90	118 (19.6)
		Mild	140-159&/or 90-99	100 (84.7) ##
		Moderate	160-179&/or 100-109	14 (11.9) ##
		Severe	≥180&/or ≥110	4 (3.4) ##
Total study population				602 (100)

**According to WHO (2014) HTN=Hypertension SBP & DBP=Systolic blood pressure; respectively. #, ##% from self-reported & newly discovered HTN; respectively*

Table (2): Treatment Practices and Reasons of Non-Adherence among Self-Reported Hypertensives

Variables	N (%) #
Treatment practices: (N=74)	
Prescribed anti-hypertensive*	51 (68.9)
Decreased salt intake	38 (51.4)
Control/lose weight	19 (25.7)
Ate healthy foods	21 (28.4)
Practice physical exercise	12 (16.2)
Stopped smoking	9 (12.2)
Other treatments**	15 (20.3)
No treatment	18 (24.3)
Reasons of non-adherence:(N=51)	
Forgetting	32 (62.7)
Too many medication	29 (56.9)
No symptoms	15 (29.4)
High cost	25 (49.0)
Blood pressure is normal now	7 (13.1)
Non-availability of free drugs	41 (80.4)
Long term treatment is unfeasible	13 (25.5)
Side effects of drugs	18 (35.3)
Drugs are ineffective or useless	11 (21.6)
Other treatment practices (non-drug)	9 (17.6)
Take drugs on needs (if there is symptoms)	10 (19.6)
Others**	30 (58.8)

*#Categories are not mutually exclusive. *0ne drug (%), 2 drugs (%), 3 drugs (%) and 4 drugs (%). **Herbs, avoid stress, adequate rest, traditional practices (e.g. Hejama or cupping, Yoga)*

recommendation, a score of 0 is given. The MDSS ranges between 0 and 24 points for adults/elderly. According to the analysis of the ROC curve, MDSS showed a significant discriminative capacity between adherence and non-adherence to the MD pattern (optimal cutoff point=13.50; sensitivity=74%; specificity=48%).[10]

Excess salt intake was considered if the subject answered yes to any of the three statements: eating salty foods (e.g. pickles, salted fish, canned food), adding excess salt during cooking and adding more salt to food just before eating (at table).

Physical activity was assessed using the Arabic short form from the International Physical Activity Questionnaire (IPAQ-short) available at www.ipaq.ki.se.[12] Self-reported duration and frequency of physical activity during the last week was assessed. Physical activity level was grouped into low (no activity or some activity but not enough to meet moderate or high physical activity levels); moderate (any of the following 3 criteria: vigorous activity for ≥ 20 minutes/day for ≥3 days *or* moderate activity and/or walking for at least 30 minutes/day for ≥ 5 days *or* any walking combination, moderate or vigorous activities achieving at least 600 MET (Metabolic Equivalent)-minutes/week) for 5 or more days and high (any one of the following two criteria: at least 3 days of vigorous activity with minimum accumulation of 1 500MET-minutes per week *or* 7 or more

days of any walking combination, moderate-vigorous activities accumulating for minimum of 3 000 MET-minutes/week).[13]

Table (3): Bivariate and Multivariate Logistic Regression Analysis of Factors Associated with Controlled Hypertension among Self-Reported Hypertension

	Total	Controlled N (%)	P	COR (95% CI)	P	AOR (95% CI)
Overall	74	35 (44.4)		(35.7-58.9)		
Age (years):						
• **<60**	54	24 (44.4)		1(r)		
• **60 & more**	20	11 (55.0)	0.4	1.5 (0.5-4.3)		
Gender:						
• **Men**	41	14 (34.1)	0.01	1(r)	0.001	1(r)
• **Women**	33	2 1(63.6)		3.4 (1.3-8.8)		46.5(6.0-310.5)
Education:						
• **< Secondary**	26	7 (26.9)		1(r)	0.001	1(r)
• **Secondary & above**	48	28 (58.3)	0.01	3.8(1.3-10.7)		14.8(3.1-70.6)
Occupation:						
• **Housewife/not working**	17	6 (35.3)		1(r)		
• **Profess/semiprofessional**	33	15 (45.5)	0.5	1.5(0.5-5.0)		
• **Others**	24	14 (58.3)	0.15	2.6(0.7-9.3)		
Family history of HTN						
• **Yes**	37	15 (40.5)		1(r)		
• **No**	37	20 (54.1)	0.2	1.7(0.7-4.3)		
Social class:						
• **Low/very low**	48	18 (37.5)		1(r)		
• **Middle/high**	26	17 (85.4)	0.02	3.1(1.2-8.5)		
Physical activity:						
• **Inactive**	52	24 (46.2)		1(r)		
• **Minimal/high**	22	11 (50.0)	0.8	1.2(0.4-3.2)		
MDSS:						
• **Non-adherent**	47	22 (46.8)	0.9	1(r)		
• **Adherent**	27	13 (48.1)		1.1(0.4-2.7)		
Obesity:						
• **No**	20	11 (55.0)	0.4	1(r)		
• **Yes**	54	24 (44.4)		0.7(0.2-1.8)		
Smoking:						
• **Yes**	27	7 (25.9)	0.005	1(r)		
• **No**	47	28 (59.6)		4.2(1.5-11.9)		
Drug adherence:						
• **No**	51	17 (33.3)	≤0.001	1(r)	≤0.001	1(r)
• **Yes**	23	18 (78.3)		7.2(2.3-22.7)		40.3(6.5-251.5)

COR=crude odds ratio, AOR=Adjusted odds ratio, CI=Confidence interval. Regression model: Constant=4.9, % correctly predicted =85.1 & Model χ^2=54.2, P≤0.001

Blood pressure measurements: Blood pressure was measured in sitting position in the right arm with pre-tested mercury sphygmomanometer and stethoscope. For all readings, Korotkoff Phases V and I were used to start the levels of diastolic and systolic blood pressure; respectively. Three readings of systolic and diastolic pressure were taken at approximately five minute intervals. Participants were informed about their blood pressure status and referred to a health provider whenever appropriate. The mean of the second and third blood pressure readings was used to assign respondents into the following categories: normotensive (normal BP without antihypertensive intake), known hypertensive (previously diagnosed hypertension with or without treatment of at least three months duration), as well as newly diagnosed hypertensive (categorized into mild, moderate or severe

based on WHO (2014) criteria.[14] When the respondent's blood pressures fell into different categories, the higher category was used to classify the respondent's

Table (4): Bivariate and Multivariate Logistic Regression Analysis of Factors Associated with Adherence to Drug Treatment of Hypertension among Self-Reported Hypertensives

	N	Adherent N (%)	P	COR (95% CI)	P	AOR (95% CI)
Overall	74	23 (31.1)		(20.3-41.9)		
Age (years):						
• **<60**	54	15 (27.8)	0.3	1(r)		
• **60 & more**	20	18 (40.0)		1.7 (0.6-5.1)		
Gender:						
• **Men**	41	6 (18.2)	0.03	1(r)	≤0.01	1(r)
• **Women**	33	17 (41.5)		3.2 (1.1-9.4)		1.4 (1.3-13.1)
Education:						
• **< Secondary**	26	6 (23.1)	0.3	1(r)		
• **Secondary & above**	48	17 (35.4)		1.8 (0.6-5.4)		
Occupation:						
• **Housewife/not working**	17	5 (29.4)	0.5	1(r)		
• **Profess/semiprofessional.**	33	13 (39.4)	0.5	1.6 (0.4-5.5)		
• **Others**	24	5 (20.8)		0.6 (0.2-2.7)		
Family history of HTN						
• **Yes**	37	12 (32.4)	0.8	1(r)		
• **No**	37	11 (29.7)		0.9 (0.3-2.4)		
Social class:						
• **Low/very low**	48	13 (27.1)	0.3	1(r)		
• **Middle/high**	26	10 (38.5)		1.7 (0.6-4.6)		
Physical activity:						
• **Inactive**	52	18 (34.6)	0.3	1(r)		
• **Minimal/high**	22	5 (22.7)		0.6 (0.2-1.8)		
MDSS:						
• **Non-adherent**	47	13 (27.7)	0.4	1(r)		
• **Adherent**	27	10 (37.0)		1.5 (0.6-4.2)		
Obesity:						
• **No**	20	5 (25.0)	0.5	1(r)		
• **Yes**	54	18 (33.3)		1.5 (0.5-4.8)		
Smoking:						
• **Yes**	27	3 (11.1)	0.005	1(r)	0.005	1(r)
• **No**	47	20 (42.6)		5.9 (1.6-22.5)		7.4 (1.8-29.6)

COR=crude odds ratio, AOR=Adjusted odds ratio, CI=Confidence interval, Regression model: Constant=-3.1, % correctly predicted =73.0 & Model χ^2=15.0, P≤0.001

pressure. Known hypertensive patient were asked about treatment practices of hypertension in the past 2 weeks[15] with a BP measurement <140/90 mmHg indicating controlled hypertension. The Arabic version of Morisky's medication adherence scale (MMAS-8) [16] was used to measure treatment adherence of known hypertensive during the past two weeks. The score of the MMAS-8 ranged from 0 to 8, and each item in the questionnaire carried one point. The first seven items required a yes (1) or no (0) answer, while the eighth was answered on a 5-point Likert scale that was dichotomized into "always," "usually," "sometimes" or "every now and then" (0) or "never/rarely" (1). The final score described the adherence levels; a perfect eight meant high adherence, a score from seven to six meant medium adherence and, finally, a score less than six meant low adherence.[17] Furthermore, only patients with high adherence scores were considered adherent and those with low and medium adherence scores were considered non-adherent.

Anthropometric measurements of weight and height were taken. Measurements of height with no shoes were rounded to the closest 0.5 cm and weight measurements with minimal clothes were adjusted to the

Table (5): Bivariate and Multivariate Logistic Regression Analysis of Factors Associated with Newly Discovered Hypertensives

	Control N (%)	HTN N (%)	P	COR (95% CI)	P	AOR (95% CI)
Total	410 (100)	118 (100)				
Age (years):						
• **<40**	160 (39.0)	24 (20.3)		1(r)		1(r)
• **40-59**	214 (62.2)	74 (62.7)	≤0.001	2.3 (1.4-3.8)	≤0.001	3.5 (1.8-6.7)
• **60 & more**	36 (8.8)	20 (16.9)	≤0.001	3.7 (1.8-7.4)	0.03	2.8 (1.1-6.7)
Gender:						
• **Women**	228 (55.6)	46 (39.0)	≤0.001	1(r)	0.008	1(r)
• **Men**	182 (44.4)	72 (61.0)		3.9(2.5-6.0)		2.3(1.2-4.2)
Education:						
• **< secondary**	122 (29.8)	53 (44.4)		1(r)		
• **Secondary**	212 (51.7)	44 (37.3)	≤0.001	0.5 (0.3-0.8)		
• **Above secondary**	76 (18.5)	21 (17.8)	0.1	0.7 (0.5-1.2)		
Occupation:						
• **Housewife/not working**	149 (36.6)	31 (26.3)		1(r)		
• **Profess/semiprofessional**	169 (41.2)	47 (39.8)	0.3	0.5 (0.3-1.0)		
• **Others**	92 (22.4)	40 (33.9)	0.07	1.6 (1.0-2.6)		
Family history of HTN						
• **No**	271 (66.1)	60(50.8)		1(r)	≤0.001	1(r)
• **Yes**	139 (33.9)	58(49.2)	0.003	1.9(1.2-2.9)		3.1 (1.7-5.4)
Social class:						
• **Very low**	88 (21.5)	43 (36.4)		1(r)		
• **Low**	94 (22.3)	28 (23.7)	0.08	1.6 (0.9-2.9)		
• **Middle**	114 (27.8)	26 (22.0)	0.4	0.8 (0.4-1.4)		
• **High**	114 (27.8)	21 (17.8)	0.1	0.6 (0.3-1.2)		
Physical activity:						
• **High activity**	138 (33.7)	26 (22.0)		1(r)		1(r)
• **Minimal activity**	105 (25.6)	28 (23.7)	0.2	1.4 (0.8-2.6)	0.1	1.2 (0.9-4.0)
• **Inactive**	167 (40.7)	64 (54.2)	0.005	2.0 (1.2-3.4)	0.009	2.9 (1.3-6.3)
MDSS:						
• **Non-adherent**	120 (29.3)	20 (16.9)	0.008	1(r)		
• **Adherent**	290 (70.7)	98 (83.1)		2.0 (1.2-3.4)		
Obesity:						
• **Normal**	91 (22.2)	7 (5.9)	0.005	1(r)	0.25	1(r)
• **Overweight**	102 (24.0)	26 (22.0)	≤0.001	3.3 (1.3-7.9)	0.001	1.8 (0.7-5.1)
• **Obese**	217 (52.9)	85 (72.0)		5.1 (2.3-11.4)		5.1 (2.0-13.0)
Smoking:						
• **No**	358 (87.3)	80 (67.8)	≤0.001	1(r)	≤0.001	1(r)
• **Yes**	52 (12.7)	38 (32.2)		3.3 (2.0-5.3)		5.8 (2.8-11.9)
Cholesterol:						
• **Normal**	344 (83.9)	79 (66.9)	≤0.001	1(r)	≤0.001	1(r)
• **High**	66 (16.1)	39 (33.1)		2.6(1.6-4.1)		4.8 (2.5-9.2)
TG:						
• **Normal**	383 (93.4)	100 (84.7)	0.003	1(r)		
• **High**	27 (6.6)	18 (15.3)		2.6 (1.4-4.8)		
LDL:						
• **Normal**	347 (84.6)	88 (74.6)	0.011	1(r)		
• **High**	63 (15.4)	30 (25.4)		1.9(1.1-3.1)		
HDL:						
• **Normal/high**	237 (57.8)	82 (69.5)	0.022	1(r)	0.004	1(r)
• **Low**	173 (42.2)	36 (30.5)		1.7 (1.1-2.6)		3.2 (1.4-7.2)
Excess salt intake:						
• **No**	294 (71.7)	52 (44.1)	≤0.001	1(r)	≤0.001	1(r)
• **Yes**	116 (28.3)	66 (55.9)		3.2 (2.1-4.9)		17.5 (7.5-40.6)

COR=crude odds ratio, AOR=Adjusted odds ratio, CI=Confidence interval. Regression model: Constant= -8.3, % correctly predicted =83.5& Model χ^2=170.5, P≤0.001

closest 0.1 kg. Body mass index (BMI) was calculated by dividing the weight in kilograms by the squared meters of height. Participants with a BMI less than 18.5 were categorized as underweight, others with BMI between 18.5 and 24.9 were normal weight, and participants with BMI ranged between 25 and 29.9 were labeled overweight, while individuals with a BMI of 30 or more are labeled obese. [18]

Lipogram**:** Levels of lipids in blood and lipoproteins were tested on an overnight fasting sample and were stored at −20°C. Cholesterol oxidase enzymatic method used to measure serum triglyceride (TG), direct magnesium/dextran sulfate method was used to measure the levels of Triglycerides and high-density lipoprotein cholesterol (HDL-C). Friedewald equation was used to calculate LDL-C and Non-HDL-C was calculated by deducting the HDL-C level from TC. The cut off points were defined according to WHO guidelines. [19]

Data analysis

Data were analyzed by SPSS (Statistical Package for Social Sciences) version 20. Number and percent were used to present the variables. For bivariate analysis, Chi square was used to test the significance and crude odds ratios (COR) and their 95% CI were calculated. Variables with significant association with hypertension in bivariate analysis were tested for multivariate logistic regression model using forward Wald method. Adjusted OR and their 95% CI were calculated. P≤0.05 was considered statistically significant.

Ethical Considerations

Approval was obtained from the Institution Board of Research of the Faculty of Medicine, Mansoura University. Researches were officially authorized from the village Family Medicine Center director. Written informed permission was obtained from participants after thorough explanation of the study aim. Privacy and data confidentiality were insured.

Results

The mean age of the study participants was 44.6±15.9 years. Table 1 shows that the overall prevalence of hypertension in Meet Al-Amel Village was 31.9%; where 74 (12.3) were self-reported and 118 (19.6) were newly discovered hypertension patients.

Table 2 portrays treatment practices and reasons of non-adherence of self-reported hypertension. Slightly lower than one fourth (24.3%) reported no treatment, while68.9% reported that they were on one or more antihypertensive drug(s). the frequent reasons of non- adherence to treatment among 51 patients were non availability of free drugs (80.4%), forgetting the medications (62.7%), other causes like taking herbs or trying traditional remedies, avoid stress and adequate rest (58.8%) and too many medications (56.9%).

In table 3, the multivariate logistic regression model has elaborated that being a woman (AOR=46.5), being adherent to drug therapy (AOR= 40.3) and secondary or higher education levels (AOR= 14.8) as the only independent predictors for controlled hypertension among self-reported hypertensive.

The multivariate logistic regression model has recognized that being a woman (AOR=1.4) and non-smoking (AOR=7.4) as the single independent predictor for adherence to drug treatment of hypertension among self- reported hypertension (table 4).

In table 5, the multivariate logistic regression model has identified that excess salt intake (AOR= 17.5), smokers (AOR=5.8), obesity (AOR=5.1), high

cholesterol level (AOR=4.8), those belong to 40-59 age group (AOR=3.5), low HDL (3.2) , positive family history of hypertension (AOR= 3.1), physical inactivity (AOR= 2.9), those ≥ 60 years old (AOR=2.8) and men (AOR=2.3) are predictors of newly discovered hypertension.

Discussion

According to WHO report, hypertension ranks fourth in prevalence of any diseases worldwide.[20] Hypertension constitutes a public health problem in Egypt. It has a high prevalence with low rates of awareness and management.[21] The present study revealed that the overall prevalence of hypertension in Meet Al-Amel village was 31.9%; where 12.3% were self-reported and 19.6% were newly discovered hypertensive[22] reported a prevalence of hypertension among inhabitants of Cairo was around 31% which agrees with the current study finding. On the other hand, other study[7] concluded that hypertension prevalence rate was only 16.5% among adults in Cairo, Egypt. According to a systematic review for cardiovascular risk factors in the Middle East,[23] the prevalence of hypertension was 21.7%. However, the Saudi Ministry of Health reported that hypertension is found among 51.2% of those aged 55-64 years and up to 70% among those aged 65 years and older.[24] On the other hand, It was found that the prevalence of hypertension in urban India 26.5%.[25] Moreover, a study in Iran[26] stated a prevalence rate of hypertension of 20.1%; of whom self-reported hypertension was 12.3%. This discrepancy in the prevalence rates may be attributed to variation in the socio-demographic characteristics, especially age distribution and residence (urban versus rural) and due to sampling variability.

The "rule of halves" for hypertension states that: 'half the population with high blood pressure are not recognized, half of those recognized are not treated and half of those treated are not controlled'. If this is valid then only 12.5% of the hypertensive population would be receiving the optimal treatment.[27]

Treatment adherence for hypertension in the present study was 68.9% which is much lower than 88.6% reported by among hypertensive patients attending a hypertension clinic in Kuwait[28] and lower than the compliance rate of 82.2% reported[29] in India. The methods employed in assessing the treatment adherence and presence of effective primary health care system may explain this difference.

Affordability for the drugs, asymptomatic nature of the disease[30] and side-effects of drugs[31] are the main reasons for non-compliance. These causes differ a little bit from the present study findings which found that non availability of free drugs (80.4%), forgetting the medications (62.7%), other causes like trying herbs or traditional remedies (58.8%) and too many medications (56.9%) were the most frequently documented causes. The reasons for non-adherence for treatment of hypertension was best reported as that patients will not stick to drugs that they cannot afford, as treatment is not affordable or practical for most developing countries. Moreover, absence of efficient primary health care services means that even free or inexpensive drugs cannot be dependably provided to those in need. Also, more than 58% of expenditure on health care in Egypt is out of the pocket.[21]

The present study revealed that being a woman and being non- smoker are the only independent risk factors for adherence to drug treatment of hypertension among self –reported hypertensive. These findings are somewhat in congruence with a study reported from India.[29]

Multivariate logistic regression has identified that being a woman, being adherent to drug therapy and secondary or higher education levels as the only independent variables or predictors for controlled hypertension among self-reported hypertensive. Similar findings were described in USA.[32] However, different study stated that private insurance, nonsmoker status and number of medications used were associated with hypertension control.[33] The difference in studied population may explain this discrepancy.

Excess salt intake, smoking, obesity, high cholesterol level, those belonging to 40-59 age group, low HDL, positive family history of hypertension , those ≥ 60 years old and men are predictors associated with newly discovered hypertension in the present work. However, using the data from Framingham Heart Study, predictors of new-onset hypertension were concluded**.** For isolated diastolic hypertension, male gender was found as a risk factor and for isolated systolic hypertension, female was a risk factor.[34] Different risk profiles for newly diagnosed hypertension in women and men were elaborated**.**[35] The important differences were that newly diagnosed high blood pressure in men was associated with high alcohol consumption. Regular physical activity was protective in females with no significant association in males.

On the contrary, age and obesity were found the only independent risk factors for hypertension.[7] Similarly, the current study agree with a Chinese study recorded 4.2 as the odds ratio for obesity and hypertension[36] and with a national Saudi study.[37] Also, in Palestine current smoking status was found among 8.3% of hypertensive patient.[38] The results of the current study are in accordance with the study found that hypertension was more prevalent in males and the prevalence of hypertension increased with age and declined only in the 55-64 years age group.[25] On contrast to the current study, it was reported that physical activity is not a predictors for the occurrence of hypertension in Indian rural areas.[39]

Conclusion

Hypertension is highly prevalent in Meet Al-Amel village and most of cases are newly diagnosed. Uncontrolled known hypertension and non-adherence to treatment are common. Many modifiable factors are associated with newly diagnosed cases.

Recommendations

Based on the findings it is recommended to implement a health education program with stress on promoting physical activity, controlling obesity and decreasing salt intake. It is important to carry out periodic measurement of blood pressure for early detection of new case and to monitor treatment of old cases. Availability of antihypertensive at the local family health unit as well as improving adherence to treatment will contribute to adequate control of hypertension. All these measures are within the activities of the primary health care.

Study limitations

This is a local study in a single village and its results cannot be generalized to all rural Egypt. Excess salt intake was measured subjectively as there is not standardized tool and the possibility of error and recall bias cannot be excluded.

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