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NUTRITION STATUS AND MAJOR RISK FACTORS OF HYPERTENSION AMONG ADULTS IN TIGRAY, NORTH ETHIOPIA; A CASE CONTROL STUDY

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ABSTRACT

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Introduction: - The nutritionalstatusand health outcome of older persons in low-income countries including Ethiopia is inadequately documented. Logistical difficulties and the absence of simple, easy-to-handle assessment instruments and data-collection problems in this environment are evident. As a result, nutritional data for older adults are inadequate. The scanty, mainly hospital-based, data that are available are not comprehensive, and they fail to incorporate essential indicators of nutritional status.

Objectives: - the aim of this study was to assess the nutrition status and major risk factors of hypertension among adults In Tigray, Ethiopia.

Methods: - A case control study design was used to assess the nutritional status and major risk factors of hypertension among adults in Tigray, Ethiopia. The study was conducted from Dec, 2010 to October, 2011. The study populations were both adult men and women (age >=40) residing in Tigray region. The study was conducted in three randomly selected hospitals. Sample size was calculated using Epi info statcalc, a structured questionnaire was used. The data was handled confidentially, and entered in to Epi info 2002 and exported to SPSS version 19 statistical program for analysis. Descriptive statistics and Binary logistic regression was run to test association. 95% confidence interval, p-value and OR was calculated and interpreted accordingly. Ethical clearance was obtained from CHS, Mekelle University.

Result: - A total of 220 (110 cases and 110 controls) respondents (104 males and 116 females) had been enrolled in this study; the mean age of the respondents was 60.3 (SD 8.8), the mean body mass index (BMI) was 23, 49% 0f them were with no formal schooling and 77.3% were married and the life style and behavior of the respondents were also evaluated and 91% of them were non smokers, 39% had ever consumed alcoholic drinks such as beer, wine, etc. Furthermore, advanced statistical analysis was calculated to test whether there exist association between the socio-demographic variables and the presence of hypertension in the adults, and being a female was 0.14 times less likely to have hypertension, and being in the age range of 61-80 were 1.73 times likely to develop hypertension as compared with those between the age range of 40-60 with the OR of 0.14 (0.05, 0.35) and 1.73 (1.02, 2.95) respectively. Whether life style and behavior of the respondents have association with hypertension was calculated and it was observed that, those who do not take alcoholic beverages were 0.28 times less likely to have hypertension than those who take alcohol with OR of 0.28 (0.10, 0.74).

Conclusion and recommendation: - The risk factors of hypertension and the nutritional status of adults in Tigray is an area for concern, as it constitutes a silent epidemic that is not matched with comparable level of awareness among policy makers or intervention by the health system. Considering the fact that there is only a limited pool of information on the burden of non communicable disease or their risk factors of adults in Tigray, an important input of this study would be to raise awareness about the problem among the population and policy makers so as to bring chronic diseases in general, and hypertension in particular, into the health research and policy agenda. Programs for the prevention and control of hypertension and their risk factors should be designed and implemented as a matter of urgency.

INTRODUCTION: As in high-income countries, ischemic heart disease and cerebro-vascular diseases followed by neoplasm and respiratory diseases, now cause the vast majority of deaths occurring at older ages in low-income countries. Mortality figures can be deceptive, however, by creating the impression that the diseases of the past no longer prevail [1]. Morbidity figures are more useful since, while they indicate that many diseases no longer kill as early in life, it is nevertheless clear that they are still prevalent. For the foreseeable future low-income countries will continue to face the dual challenge of coping with both high morbidity and disability rates due to infectious diseases and high rates for the superimposed emerging chronic diseases characteristic of ageing societies [2].

The nutritional status and health outcome of older persons in low-income countries (in Ethiopia which accounts for 6.1% and in Tigray nearly 274,500 elder people) is inadequately documented. Logistical difficulties and the absence of simple, easy-to-handle assessment instruments and data-collection problems in this environment are evident. As a result, nutritional data for older adults are inadequate [3].

The scanty, mainly hospital-based, data that are available are hardly comprehensive, and they fail to incorporate essential indicators of nutritional status. Food-intake assessments are rarely conducted among older persons in low income countries, yet such assessments play a crucial role in detecting relationships between dietary exposure and disease causation. Nutritional problems are at the root of the major communicable and chronic non-communicable diseases, which are impediments to achieving both national and international health goals and economic and social progress [4, 5].

Therefore, studies related to nutritional status and associated factors of hypertension of the adult people have of paramount importance to achieve the ultimate goal of healthy and active ageing, to promote health and well-being throughout the life course of the elderly people.

General objective: To assess nutritional status and major risk factors of hypertension of adults, in Tigray, Ethiopia.

Specific objectives:

- To measure the nutritional status using a body mass index (BMI) of adult people, in Tigray region, Ethiopia.

- To investigate the risk factors of hypertension in the adult people, in Tigray, Ethiopia.

MATERIALS AND METHODS:

Study design: A Case control study design was conducted from Dec, 2010 to June, 2011.

Study area: According to the Tigray Regional Health Bureau (TRHB) 2009 profile Tigray is the northern most national regional state of Ethiopia and is located between latitude 12 and 15 degrees north. The region is divided in to northwestern and southern low lands (700-1500 meters above sea level) and central high lands (1500-3000 meters above sea level). The region covers 54,572.6 square kilometers, population in the 1994GC census was 3.16 million and growth rate is estimated at 3% per year. The 2006-2007 projected population is estimated to be 4,335,000 of which 82% are rural and 51% of the totals are female. In Tigray, nearly 274,500 people are older than 60 years of age there are 12 Governmental hospitals providing service to the community. Currently, one additional specialized training hospital has emerged to serve for all referral cases.

Study population: The study populations were both elder men and women (age >=40) residing in Tigray region. Cases were Age >= 40, Patients in hospital who were admitted to or who came for follow-up with the cases of Hypertension and Patients who fulfill the criteria of case definition set by WHO on hypertension. Controls were, Age >= 40Years, People who came to the hospitals for any other purpose, and do not have the disease Hypertension.

Sample size and sampling procedure: Sample size was calculated by using Epi-Info statcalc with the assumption of 95% C.I., 80% power, and the expected frequency of the controls be 50%, the closest OR to one (1.35), and percent of exposure among cases closest to percent for controls be 57.45%, and with the proportion of 1:1 (one control for one case); the sample size for controls was 110 and for cases 110 and

a total of 220 study participants were needed. A systematic random sampling was used, the cases were equally allocated to each hospital under the study, and the controls were also equally allocated to each hospital.

Variables of the study:

Explanatory variables were;

- **Socio-demographic variables** (Age, Sex, Marital status, occupation, Educational status (family size), Economic status, Religion, Geographic location;

- **Nutritional variables**-Nutrition habits; Frequency of eating of fruits and vegetables, Life style (Alcohol intake, smoking, exercise), Nutritional status: Mal-nourished (BMI, of less than 18), Well-nourished (BMI, of 18-25);

- **Outcome variable**- Health status – Patients whose age >= 40 and having the diseases, hypertension.

Data collection procedure: After getting ethical clearance from the Institutional review Board of Mekelle University; A structured questionnaire was administered to both cases and control which have open and closed and type of equations. **For cases-**cards (medical) was referred to find out the disease under the study and a full medical examination was done (History, physical examination and investigations).

For controls- there will be a full medical examination to ascertain the health of the controls from hypertension. To assess the nutritional status of the elderly people anthropometric, clinical and dietary survey was used.

Data processing and analysis: After the data collection, the data was handled confidentially, and entered in to Epi info 2002 and exported to SPSS version 19 statistical program for analysis. Frequency tables, graphs and proportions were used to present the data. In addition, measures of central tendency were calculated and the association between dependent and independent variables was determined using Binary logistic regression to control confounding factors.

95% confidence interval, p-value and OR was calculated and interpreted accordingly.

RESULT: A total of 220 (110 cases and 110 controls) respondents (104 males and 116 females) had been enrolled in this study; the mean age of the respondents was 60.3 (SD 8.8), the mean body mass index (BMI) was 23, 49% 0f them were with no formal schooling and 77.3% were married (**Table 1**).

TABLE 1: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE RESPONDENTS, TIGRAY, ETHIOPIA, 2011

Variable	n	%
Sex		
Male	104	47.3
Female	116	52.7
Total	220	100
Age		
40-45	20	9.1
46-50	15	6.8
51-60	14	6.4
61-65	60	27.3
66-70	91	41.4
71-75	20	9.1
Total	220	100.0
Educational status		
no formal schooling	108	49.0
primary school completed	49	22.3
secondary school completed	28	12.7
college or university level	35	16.0
Total	220	100.0
Marital status		
never married	3	1.4
currently married	170	77.3
divorced	19	8.6
widowed	28	12.7
Total	220	100.0
Occupational status		
government employee	60	27.3
self employed	18	8.2
merchant	43	19.5
retried	51	23.2
unemployed(able to work)	17	7.7
unemployed(unable to work)	31	14.1
Total	220	100.0
Family monthly income		
Less than 500 Birr	92	41.8
501-1000	78	35.5
1001-1500	21	9.5
1501-2000	15	6.8
2001-2500	6	2.7
Greater than 2500	8	3.7
Total 220		**100.0**

The life style and behavior of the respondents were also evaluated and 91% of them were nonsmokers, 39% had ever consumed alcoholic drinks such as beer, wine, etc, (**Table 2**).

TABLE 2: LIFE STYLE AND BEHAVIOR OF RESPONDENTS, TIGRAY, ETHIOPIA, 2011

Variables	Response	n	%
do you currently smoke any tobacco products, such as cigarettes, cigars or pipes	Yes	19	8.6
	No	201	91.4
	Total	220	100.0
have you ever consumed an alcoholic drinks such as beer, wine, sprits, fermented cider	Yes	86	39.1
	No	134	60.9
	Total	220	100.0
have you consumed an alcoholic drink with in the past 12 months	Yes	88	40.0
	No	132	60.0
	Total	220	100.0
Have you consumed an alcoholic drink with in the past 30 days	Yes	66	30.0
	No	154	70.0
	Total	220	100.0
In atypical week, on how many days do you eat fruit	none per week	64	29.1
	once a week	58	26.4
	twice a week	53	24.1
	Three times a week	45	20.5
	Total	220	100.0
in atypical week on how many days do you eat vegetables	none	62	28.2
	once a week	34	15.5
	twice a week	65	29.5
	Three times a week	40	18.2
	four times a week	19	8.6
	Total	220	100.0
does your work involve vigorous intensity activity that cause large increases in breathing or heart rate	yes	64	29.0
	no	156	71.0
	Total	220	100.0

Furthermore, advanced statistical analysis was calculated to test whether there exist association between the socio-demographic variables and the presence of hypertension in the adults, and being a female was 0.14 times less likely to have hypertension, and being in the age range of 61-80 were 1.73 times likely to develop hypertension as compared with those between the age range of 40-60 with the OR of 0.14 (0.05, 0.35) and 1.73 (1.02, 2.95) respectively (**Table 3**).

TABLE 3: SOCIO-DEMOGRAPHIC CHARACTERISTICS VS HYPERTENSION OF RESPONDENTS, MEKELLE, ETHIOPIA, 2011

Variables	Hypertension		Adjusted OR, 95% C.I.
	Cases (n)	Controls (n)	
Sex			
male	44	60	1
female	66	50	**0.14 (0.05, 0.35)***
Age			
40-60	62	47	1
61-80	48	63	**1.73 (1.02, 2.95)***
Educational status			
no formal schooling	38	70	1
primary school completed	29	20	**0.18 (0.06, 0.44)***
secondary school completed	16	12	**0.11 (0.03, 0.42)***
college or university level	27	8	**0.04 (0.01, 0.18)***
Monthly income (1Bir=17.00USD)			
Less than 500 Birr	53	39	1
501-1000	33	45	1.18 (0.51, 2.72)
1001-1500	14	7	0.38 (0.09, 1.45)
1501-2000	7	8	0.73 (0.18, 2.93)
Greater than 2000	3	11	1.39 (0.16, 11.79)
Occupational status			

government employee	33	27	1
self employed	10	8	0.21 (0.04, 1.09)
merchant	26	17	**0.08 (0.09, 0.36)***
retired	22	29	**0.17 (0.04, 0.75)***
unemployed(able to work)	7	10	0.19 (0.03, 1.19)
unemployed(unable to work)	12	19	0.34 (0.08, 1.45)

Whether life style and behavior of the respondents have association with hypertension was calculated and it was observed that, those who do not take alcoholic beverages were 0.28 times less likely to have hypertension than those who take alcohol with OR of 0.28 (0.10, 0.74) (**Table 4**).

Table 4 life style and behavior Vs hypertension of respondents, Tigray, Ethiopia, 2011

Variables	Response	Hypertension		Adjusted OR, 95% C.I.
		Cases (n)	Controls (n)	
do you currently smoke any tobacco products, such as cigarettes, cigars or pipes	Yes No	11 99	8 102	1 1.71 (0.60, 4.86)
have you ever consumed an alcoholic drinks such as beer, wine, sprits, fermented cider	Yes No	41 69	45 65	**1** **0.28 (0.10, 0.74)***
have you consumed an alcoholic drink with in the past 12 months	Yes No	40 70	26 84	1 2.43 (0.93, 6.37)
Have you consumed an alcoholic drink with in the past 30 days	Yes No	51 59	37 73	1 1.822 (0.77, 4.34)
In atypical week, on how many days do you eat fruit	None once a week twice a week Three times a week	43 25 22 20	21 33 31 25	1 **0.10(0.03, 0.33)*** 0.64 0.26, 1.57) 0.71 (0.31, 1.90)
In atypical week on how many days do you eat vegetables	None once a week twice a week Three times a week four times a week	27 17 41 16 9	35 17 24 24 10	1 **o.26 (0.09, 0.24)*** **0.24 (0.08, 0.03)*** **0.07 (0.06,0.86)*** **0.31 (0.80, 0.94)***
does your work involve vigorous intensity activity that cause large increases in breathing or heart rate	yes no	34 76	30 80	1 0.85 (0.43, 1.70)

DISCUSSION: Though hypertension in adults is of multifactorial causes; Life style and behavior of the adults, Poor nutritional status and malnutrition in the elderly population are important areas of concern. Nonetheless, many health care practitioners inadequately address the multifactorial issues that contribute to nutritional risk and to malnutrition. A common assumption is that nutritional deficiencies are inevitable consequences of aging and disease and that intervention for these deficiencies are only minimally effective.

This study assessed to address some of the factors contributing for the development of hypertension in the elderly population attending clinical follow up in hospitals.

A total of 110 hypertensive and 110 non hypertensive adults with age 40 and above were included, nearly 53% of the respondents were females, and majority of the respondents (49%) were not having formal education, over two third were currently married and 41% of them were having a monthly income of less than Birr 500.

In this study the mean BMI is within the normal range and this is in line with a study from Butajira with MBI of 19.4 [9]. But studies in Addis, Nigeria and Pakistan have shown high Value of BMI (> 25) among hypertensive patients [10] and this difference could be b/c of the difference in life style b/n urban and rural dwellers.

The life style and behavior of the respondents in this study showed that 91.4% of the respondents were nonsmokers and this is in line with a study in Addis [11], 39% of the respondents in our finding have ever consumed alcohol: 40% have consumed alcoholic beverages in the last 12 months, and 30% of them have consumed alcohol in the last 30 days of the interview.

Conditions of nutrition concerning the intake of fruits and vegetables; in a typical week 29 percent of them did not take any type of fruit, while over 26 % of the respondents have consumed fruits from one to three times a week. In addition, in a typical week 28% of the respondents never consume vegetables; while 15.5% of them eat vegetables once a week, 29.5% eat twice a week and over 18% of the study participants eat vegetables 3-4 times a week.

Concerning regular activities and exercises, over two third of the respondents work does not involve vigorous intensity activities that increase in breathing and heart rate and this is similar with the study from Addis; this could be one of the sedentary life style that might contribute for the development of hypertension and related diseases in adults.

Whether the socio-demographic characteristics of the respondents brings a difference between the hypertensive patients and the non- hypertensive once was assessed; being a female was found to have a protective effect, while advanced age was found to contribute for the development of hypertension. This is in line with a study from Addis Ababa But a study from Nigeria and Pakistan revealed that Females are more obese than males and hypertension is highly associated with obesity [12].

Furthermore, education has a protective effect against the development of hypertension, while income had nothing to do with the disease. The advanced statistical analysis to test the relationship between the life style, behavior and hypertension showed that those respondents who never consumed alcohol were 0.28 times less likely to have hypertension as compared with those who ever drunk alcohol. Similarly, those respondents who eat fruit at least once in a typical week are 0.10 times less likely to have hypertension than those who never eat fruit in atypical week. Moreover, in a typical week those who eat vegetables once, twice, three times and four times a week are 0.26, 0.24, 0.07, and 0.31 times less likely to have hypertension as compared with those who never eat vegetables in a typical week. The presence of vigorous exercise and intensive activities that cause large increases in breathing or heart rate did not show any relationship with the having hypertension.

Limitations: As the scope of the present study does not include biochemical measurements, we were unable to determine the level of blood glucose or cholesterol. Similarly, we have not collected data on menopausal status among the women, and thus we have not controlled the potential effect of menopausal status on the risk of blood pressure in women.

Conclusion and recommendations: The risk factors of hypertension and the nutritional status of adults in Tigray is an area for concern, as it constitutes a silent epidemic that is not matched with comparable level of awareness among policy makers or intervention by the health system. Considering the fact that there is only a limited pool of information on the burden of non-communicable disease or their risk factors of adults in Tigray, an important input of this study would be to raise awareness about the problem among the population and policy makers so as to bring chronic diseases in general, and hypertension in particular, into the health research and policy agenda. Programs for the prevention and control of cardiovascular diseases and their risk factors should be designed and implemented as a matter of urgency.

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