

METABOLIC SYNDROME AMONG STROKE PATIENTS IN DUHOK/
KURDISTAN/ IRAQ

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ABSTRACT

Background: The metabolic syndrome is a highly prevalent disorder of various vascular risk factors including obesity, hypertension, diabetes mellitus, and hyper lipidaemia. The disorder has been well associated with cerebral stroke and heart disease. Since a former study of risk factors among hospitalized stroke patients had been done in Duhok, this study has been designed to assess the presence of metabolic syndrome among those stroke victims.

Patients and Methods: The study reassessed a previous case series study comprising 950 patients who presented with stroke and were admitted to the Neurology Ward at Azadi Teaching Hospital/Duhok, between January 2014-December 2014. Only 392 patients(41.3%) were found to satisfy the criteria of metabolic syndrome and therefore included in this study; they came from Duhok City and many other cities and towns around including Nineveh Governorate. A suitable format sheet had been designed to document data from the relevant records. Data were analyzed using one sample z test of proportion and Chi square test. A $p \leq 0.05$ was considered significant.

Results: Out of the studied 950 patients, only 392 patients; 254 females (64.8%) and 138 males(35.2%) were found to have at least three or more risk factors of the Metabolic Syndrome. Ages for males and females ranged from 26-98 years, (65.1±12.9) and 35-105(64.5±12.1) respectively. The patients were multiethnic and the most frequent risk factors, in a decreasing frequency, were obesity/overweight 373 (95.2%), hypertension 323 (82.4%), diabetes mellitus 273 (69.6%), and hyperlipidaemia 200 (51%). The majority of cases were of the ischemic type, 337 (86%).

Conclusions: In reference to the general population, the prevalence of MetS among Cerebral Stroke sufferers is high especially among females with relatively high prevalence of ischemic strokes in both genders.

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Keywords: Metabolic syndrome; cerebral stroke; risk factors; Azadi Teaching Hospital.

The term “metabolic syndrome” (MetS) is a subject that has received much attention in the recent times, due to increasing awareness of its association with cardiovascular morbidity and mortality. Its existence was first observed as clustering of hypertension, hyperglycemia, and gout as described by Kylin in the 1920s. Later, Jean Vague in 1947 noted its association with android obesity^{1,2,3}.

As the MetS is one of the emerging health problems of the world, researchers have found that the overall prevalence of MetS in their local urban areas was quite high; they attributed their finding to multiple factors which include increased age, female gender, higher social status, sedentary lifestyle, positive family history, and higher education. They claim that those aforementioned factors were statistically significant predictors of MetS⁴.

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Till date, the pathogenesis of MetS is yet to be clearly defined. Insulin resistance, which, clinically, is defined as requiring higher amounts of insulin to maintain euglycemia, is the key mechanism thought to underlie metabolic syndrome^{5,6}. Insulin resistance is believed to be determined not only by environmental factors but also by genetic factors as anchored in the “thrifty gene hypothesis” proposed by Neel⁷. Other genetic hypothetical models have also been suggested in Africans such as the fetal origins of chronic disease⁸. Metabolic syndrome today is not only seen in adults but it is now also beginning to occur in children and adolescents due to the growing obesity epidemic within this young population^{9,10,11}. Furthermore, some scientists have found an association between MetS and certain food stuff, physical inactivity, quality of life, the occurrence of few common cancers, and even with urolithiasis^{12,13,14,15}. The paucity of local studies that assess the association of MetS with stroke mandated the implementation of this study.

PATIENTS AND METHODS

The study reassessed the results of a previous case series study which enrolled 950 patients who presented with cerebral stroke and were admitted to the Neurology Ward at Azadi Teaching Hospital/Duhok/Kurdistan/ Iraq, between January 2014–December 2014. The patients came from Duhok City, various districts of Duhok Governorate, Mosul City, and various districts of Nineveh Governorate, therefore representing various ethnic groups.

Reviewing the data of the previous study revealed that out of the studied 950

patients with stroke, only 392 patients satisfied the adopted criteria of MetS. Patients having 3 or more of the following risk factors (RFs) were considered having the MetS^{12,13,14,17,18,19}. The first factor was obesity/overweight defined as a body mass index of ≥ 30 kg/m² and/ or a waist circumference > 102 cm in males and > 88 cm in females. The second factor was hypertension (HTN) defined as a systolic blood pressure (BP) is ≥ 130 mm Hg or a diastolic BP > 80 mm Hg (according to most recent update). The third factor was Hyperlipidemia (HL) defined as a total serum cholesterol ≥ 200 mg/dl, or triglycerides ≥ 150 mg/dl, reduced high density lipoproteins (HDL) < 40 mg/dl in males and < 50 mg/dl in females. The fourth factor was Diabetes Mellitus (DM) defined as a fasting serum blood sugar exceeding 110 mg/100 ml^{12,13,14,17,18,19}. However, although some included measurement of insulin resistance in the definition of MetS, many researchers do not; they argue that the measurement of insulin resistance by the gold standard method cannot be routinely done^{20,21}. The latter trend has been adopted in this study.

Data were analyzed using one sample z test of proportion and Chi square test. A $p \leq 0.05$ was considered significant.

RESULTS

Out of the 950 patients with stroke included in the previous study, only 392 patients (41.3%) satisfied the criteria of MetS. Those 392 patients comprised 196 (50%) residents of Duhok City and the remainder came from various districts of Duhok Governorate, Mosul City, and various districts of Nineveh Governorate, multiethnic societies (Table 1).

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Table 1: Study Sample by Residency

Residency	Number of patients	%
Duhok City	196	50%
Duhok Districts and Nineveh Governorates	196	50%
Total	392	100%

Regarding gender, the majority of stroke patients who fit the MetS criteria were females 254 (64.8%) compared to males 138 (35.2%). The gender difference was

highly statistically significant (p value < 0.001) (Table 2). As to age, male ages ranged from 26-98 years with a mean age of 65.1 ± 12.9 , while female age ranged from 35-105 with a mean age of 64.5 ± 12.1 . The most common age groups affected in both males and females were those between 50-79 years where 73.5% of cases occurred. Cases occurring below the age of 40 and above 89 constituted only a minor proportion of the total (3.6%) as is showing in Table 2.

Table 2: Study Sample by Age and Gender

Age (years)	Males No. (%)	Females No. (%)	Total No. (%)	p value*
20-29	1 (0.3)	0	1 (0.3)	
30-39	2 (0.5)	2 (0.5)	4 (1.0)	
40-49	12 (3)	20 (5.1)	32 (8.2)	
50-59	25 (6.4)	56 (14.3)	81 (20.7)	
60-69	39 (9.95)	79 (20.2)	118 (30.1)	< 0.001
70-79	32 (8.2)	57 (14.5)	89 (22.7)	
80-89	24 (6.1)	34 (8.7)	58 (14.8)	
≥ 90	3 (0.8)	6 (1.5)	9 (2.3)	
Total	138 (35.2)	254 (64.8)	392 (100)	

* Based on Chi square test

The most frequently occurring RFs for MetS in stroke patients were Obesity/overweight 373 (95.2%) followed by HTN 323(82.4%), DM 273(69.6%) and HL 200(51%) as it showing in Table 3.

Table 3: Risk Factors for Metabolic Syndrome Compared between Stroke Patients and the General Population*

Risk factor	Stroke patients proportions (%)	Population** proportions (%)	p value***
Obesity	373 (95.2)	33.5	< 0.001
Hypertension	323 (82.4)	35.6	< 0.001
Diabetes mellitus	273 (69.6)	13.9	< 0.001
Hyperlipidaemia	200 (51)	37.8	< 0.001

* A patient suffering MetS should have a minimum of 3 RFs.

**Data from the WHO "STEPS" study for risk factors in Iraq (2015)

***Based on one sample Z-test of proportion.

As to the type of stroke, the data revealed that the majority of cases were of the ischemic type, 337 (86%) compared to 55

(14%) hemorrhagic cases. The difference in the type of stroke across gender did not achieve statistical significance (p value = 0.618) (Table 4).

Table 4: Study Sample by Type of Stroke and Gender

Gender No. (%)	Type of Stroke		<i>p</i> <i>valu*</i>
	Ischemic No. (%)	Hemorrhagic No. (%)	
Males	117 (29.84)	21 (5.35)	0.618
Females	220 (56.12)	34 (8.67)	
Total	337 (86)	55 (14)	392 (100.0)

* Based on Chi square test for association

DISCUSSION

Researchers have found, in a multiethnic, prospective, population-based cohort study, that the MetS constitutes a major public health burden as defined by its prevalence, risk, and etiologic fraction and that there is a significant association between the metabolic syndrome and ischaemic stroke risk, independent of other confounding factors including age, education, physical activity, alcohol use, and current smoking. Furthermore, they claimed that with obesity epidemic, the impact of the MetS is likely to increase. They suggested that a greater emphasis needs to be placed on the early diagnosis and treatment of patients at risk for vascular disease and that further understanding of gender and race/ethnic differences in terms of their impact on the MetS will help effectively targeting populations at increased risk of ischaemic stroke¹⁸. The findings of the current study showed a lot of similarities with theirs, especially regarding the obesity and stroke (Table 3). Patients' population in this study came from two governorates in the north west of Iraq, namely Duhok and Nineveh Governorates (Table 1); although the dominant ethnic group is the Kurdish one,

however, other ethnic groups are also represented in the study, e.g. the Arabs, Christians, and Turkmen. Therefore, we can consider the present study having multiethnic profile. Regarding their finding that MetS is more common among women than men^{18,23}, our findings also support that as female cases were almost double that in males (Table 2).

Obesity/overweight is a major component that characterizes MetS. Obesity is the accumulation of excess body fat, which manifests as increased weight or waist circumference. It is commonly associated with insulin resistance²⁰. The present study shows obesity to be the most common RF among other RFs as 373(95.2%) patients were obese. Table 3. Compared to the figures of the general population as documented by the WHO Non communicable diseases risk factors "STEPS" study (2015)²², each of the four studied risk factors revealed a highly significant statistical difference (*p value*< 0.001). Table 3.

The data also show that both HTN and DM come next following obesity as there were 323(82.4%) and 273(69.6%) patients respectively; although this is almost in keeping with others' findings in the literature, however, they have found that MetS appears to be more common in the presence of DM than HTN^{24,25,26}. Table 3 The majority of patients with MetS 346 (88.3%) were at ages between 50-79 years, however, other researchers describing the current trend of MetS is that it is not only seen in adults but is now also beginning to occur in children and adolescents due to the growing obesity epidemic within this young population^{9,10,11} (Table 2).

Gender-specific differences have been demonstrated by different workers. In Africa, metabolic syndrome was found to be more common in females and to increase with age, and urban dwelling^{27,28,29}; in some other studies more in females (70.3 %) than in males (49.7 %), $p < 0.001$.³¹

However, MetS appears to be more common in females like obesity whereas hypertension appears to be more common in males^{31,32,33,34,35}. The prevalence of MetS was only observed to be higher among males from the Jos plateau of Nigeria where the authors noted that the high activity profile of women may have contributed to this observation³⁶.

In the setting of acute ischemic stroke, researchers have found that the prevalence of MetS among the patients with acute ischemic stroke is 58.3 %³⁰; however, in the current study it is 86%, a finding which we think is quite significant and alarming (Table 4). This finding may dictate the need for further studies to verify whether the increased prevalence is due to recurrences or primary attacks.

On the other hand this study had its own limitations among them that HTN is considered as a major risk factor which in turn is part of MetS which makes contributing the role of HTN alone in the causation of stroke is a rather difficult task.

Conclusions and Recommendations

1- In reference to the general population, the prevalence of MetS among CS sufferers is high especially in females with relatively high prevalence of ischemic strokes in both genders.

2- The most prevalent risk factors were obesity and hypertension.

3- Supporting national health monitoring systems and programs with their preventive and therapeutic tools to tackle such an ever growing problem.

4- Further studies are needed to verify whether the increased prevalence of ischemic stroke is due to recurrences or primary attacks and to investigate the underlying causes.

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DECLARATION OF INTEREST

Nothing declared.

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ثوختة

كوڤيشانين ميتابوليک لجهم نه خوشين سهکتها ميشکی لدهوکی/کوردستان/عیراق

نیشةکی: کوڤيشانين ميتابوليک يهکن ژ ناژاومين همر بهر به لاف کو چندين هوڤين جودا جوداين دهمارين خوڤين بخوفه دگريت ومک قهلموی و بلندبوونا فشارا خوڤين و نيشا شهکری و بهرزبوونا چهوڤين خوڤين ئەف ناژاوه گهلهک گرڤدای سهکتها ميشکينه و نيشين دلی ژ بهر هندی ئەف فهکولينا فهرمی لدهوکی لسهر هوڤين مهترسيی دناف نه خوشين سهکتی هاته کرن و ئەف فهکولينه يا هاتيه ديزاين کرن دا ههلسهنگاندا کوڤيشانين ميتابوليک بکهت لجهم قان نه خوشان.

دەر نه نجام: ئەف فهکوليني دووجار ههلسهنگاندا بو زنجيره فهکولينهکا بهری نوکه کو ۹۵۰ نه خوشين سهکتا ميشکی بخوفه دگريت کر. ئەف نه خوشه هاتبوونه نفاندن ل بهشي ميشک و دهمارا ل نه خوشخانا ناژادی لدهوکی هه ل مهها نیک ۲۰۱۴ ههتا مهها ۱۲/۲۰۱۴ ژوان بتنی ۳۹۲ نه خوش (۴۱,۳%) هاتنه ديتن کو بنچينهين کوڤيشانين ميتابوليک لي بگريت ژ بهر هندی هاتنه و هرگرتن دقي فهکوليني دا ئەم ژ دهوکی و باژار و باژيرکين دهوروبهراي بوون و ژ باژاري موسلي ژيک هاتبوون. ژبو قی مهرمی فورمهک گونجای هاتبوو ناماده کرن ژ بو سهنهکرنا زانياريان ژ تومارکنا پيوست. ئەف زانياريه هاتنه شروفهکرن ب کار نينا شيوهين زيت تيست و چوارگوشهيا کای و (ترخي بي) ژ ۰,۰۵ ب گرنگی دهاته هژمارتن.

دەر نه نجام: ژ سهرجهمی ۹۵۰ نه خوشان بتنی ۳۹۲ نه خوش ۲۵۴ می (۶۴,۸%) و نير ۱۳۸ (۳۲,۲%) هاتنه ديتن کو ب کیمی ۳ يان پتر هوڤين مهترسييا کوڤيشانين ميتابوليک هه بوون , ژبي نير و مينيان ژ ۲۶-۹۸ سال (۱۲,۱-۶۵) و ۱۰۵-۳۵ (۱۲,۱-۶۴) لدويق نیک دا. نه خوش ژ نشين جودا جودا بوون و هوڤين مهترسيی د هوسابوون ژ سهري بو خاری, قهلموی و کيشا زيده ۳۷۳ (۹۵,۲%) و فشارا خوڤين يا زيده ۳۲۳ (۸۲,۴%) و نيشا شهکری ۲۷۳ (۶۹,۶%) و زيدهبوونا چهوڤين خوڤين ۲۰۰ (۵۱%) پتريا سهکتا ژ جوڤي کيم نوکسجينی بوون.. فهگريان بو خهکي گشتی بهر به لافيا کوڤيشانين ميتابوليک دناف نه خوشين سهکتا ميشکی دا زورن تايهت دناف ژنان دا و بريژميا پتر بهر به لاف جوڤي کيم نوکسجينی لهردو رهگزان.

الخلاصة

متلازمة التمثيل الغذائي بين مرضى السكتة الدماغية في دهوك / كردستان / العراق

الخلفية والأهداف: الأيض هو اضطراب شديد الانتشار للعديد من عوامل الاختطار الوعائي بما في ذلك السمنة وارتفاع ضغط الدم والسكري وارتفاع الدهون في الدم. وقد ارتبط هذا الاضطراب ارتباطاً وثيقاً بالسكتة الدماغية والأمراض القلبية. وعند إجراء دراسة سابقة لعوامل الخطر بين مرضى السكتة الدماغية في المستشفيات في دهوك ، تم تصميم هذه الدراسة لتقييم وجود متلازمة التمثيل الغذائي بين مرضى السكتة الدماغية.

طرق البحث: قامت الدراسة بإعادة تقييم دراسة الحالات السابقة للمصابين الذين شاركوا في السكتة الدماغية وعددهم 950 مريضاً وتم إدخالهم إلى جناح الأمراض العصبية في مستشفى أزاوي التعليمي / دهوك ، في الفترة ما بين يناير 2014 وديسمبر 2014. تم العثور على 392 مريضاً (41.3%) من الذين يستوفون بمعايير متلازمة التمثيل الغذائي وبالتالي تم تضمينها في هذه الدراسة ؛ المرضى جاءوا من مدينة دهوك والعديد من المدن والبلدات الأخرى بما في ذلك محافظة نينوى. وقد تم تصميم ورقة تنسيق مناسبة لتوثيق البيانات من السجلات ذات الصلة. تم تحليل البيانات باستخدام اختبارز واحد واختبار مربع كاي. مهما $p \leq 0.05$ واعتبار النسبة

النتائج: من بين 950 مريضاً ، تم العثور على 392 مريضاً فقط لديهم ما لا يقل عن ثلاثة أو أكثر من عوامل الخطر من متلازمة التمثيل الغذائي. (female 64.8%) (و254 ذكور35.2%) 138 تراوحت أعمار الذكور والإناث بين 26-98 سنة (12.9 ± 65.1) و35-105 (12.1 ± 64.5) على التوالي. المرضى كانوا متعددي الأعراق وأكثر عوامل الاختطار شيوعاً كانت في تناقص التردد، السمنة / الوزن الزائد 373 (95.2%) ، ارتفاع ضغط الدم 323 (82.4%) ، داء السكري 273 (69.6%) ، وفرط شحميات الدم 200 (51%) 273 (337.86%) كانت من النوع الإقفاري .

الاستنتاجات: في إشارة إلى عامة السكان ، فإن انتشارمتلازمة التمثيل الغذائي بين المصابين بالسكتة الدماغية عاليةنسبياً وخاصة بين الإناث.والنسبة عالية من السكتات الدماغية الإقفارية في كلا الجنسين.