

## Blood group relationship with hypertension

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### الخلاصة:

أجريت هذه الدراسة على مجموعتين من الأشخاص الوافدين للعيادة الاستشارية للطب الباطني في مستشفى الديوانية التعليمي وبعض العيادات الخاصة للفترة من 2011 ايلول ولغاية تشرين الاول 2013 وكان مستوى العمر يتراوح بين 35-70 سنة لكلا الجنسين . تتكون مجموعة المسيطرة من 285 شخص سليم منهم 188 ذكر و 97 انثى بينما اشتملت مجموعة المرضى على 210 مريض يعاني من ارتفاع ضغط الدم منهم 125 ذكر و 85 انثى . تم تحديد نوع فصيلة الدم لكل الاشخاص، وجد ان فصيلة الدم (O) هي الاكثر شيوعا عند المرضى المصابين بارتفاع الضغط كما انه لا يوجد اختلاف مهم من الناحية الاحصائية بين كلا الجنسين عند المرضى.

### Abstract :

This study was carried out on two groups of subjects who are attending general medicine outpatient department in Al-diwaneya teaching hospital & some privet clinic during the period from September 2011 to October 2013 . the age range of both group was 35- 70 years of both sexes . The Control group consist of normal 285 healthy subjects ,including 188 males and 97 females while the patients group consist of 210 patients who are suffering from hypertension of which 125 male & 85 females. determination of blood group using antisera was done for each subject. It was founded that blood group O is more predominant among hypertensive patients , no significant difference was founded between both sex among hypertensive patients.

### Introduction:

Hypertension is a major health problem, especially because it has no clear symptoms. Many people have hypertension without knowing it. It is now well proved that modifier factors like obesity, overweight that is measured by BMI, visceral adiposity measured by waist circumference, increasing age, are associated with the high prevalence of hypertension<sup>(1,2)</sup>

Definition of hypertension is difficult and by necessity it is arbitrary. Sir George Pickering first formulated a concept that blood pressure in a population is distributed continuously as a bell-shaped curve with no real separation between normo tension and hypertension. Again hypertension may be defined as the sustained elevation of systemic arterial to a level that places the patients at increased risk for target organ damage. According to most accepted opinion the sustained systemic arterial pressure. More than 140/90 mm Hg should be considered hypertensive and should get treatment. In

other words, hypertension is defined as sustained increase in blood pressure exceeding 140 over 90 mm Hg<sup>(3,4)</sup>.

The ABO blood group system is the only system in which antibodies are consistently and predictably present in the serum of normal individuals whose red cells lack the antigens . The second type of blood group is the rhesus system. There are only two Rh phenotype such as Rh positive and Rh negative, depending on whether Rh antigen is present on the red cell or not<sup>(5,6)</sup>. despite the fact that the antigens involved are stable throughout life. The resultant polymorphism remains important in population genetic studies, estimating the availability of compatible blood, evaluating the probability of hemolytic disease in the new born, resolving disputes in paternity/maternity and for forensic purposes<sup>(7,8)</sup> .

Most geneticists believe that genetic factors are involved in susceptibility and resistance to many “non-mendelizing”

human diseases. It seems, therefore, reasonable to look for disease associations among genetic polymorphisms and a great deal of work has already been done with blood groups in this field. Since the discovery of the ABO blood groups by Landsteiner and his pupils comprehensive work have accumulated in the literature on the relation of ABO blood group to blood transfusion, on its anthropological and genetic applications, on its use in medico legal, identification on disputed paternity and, on its significant association with the relative susceptibility to various diseases<sup>(9)</sup>.

The vast interest arising out of a blood group lies in the fact that the character of the ABO blood groups is exclusively and integrally heritable, genetically determined at conception and remain fixed for life, hence its frequency distribution follows a known pattern governed by gene transmission from generation to generation and varies with the race and geographical distribution of human being<sup>(9)</sup>

The ABO blood type, an easily accessible factor in patient's genetic make-up has been associated with many diseases, though the explanation for the association between ABO blood groups and some diseases is still unclear. Blood cellular genes and gene aberrations may be associated with the diseases<sup>(10)</sup>. The frequency of ABO and Rh phenotypes in different populations has been extensively studied. Different blood groups have been shown to be particularly associated with different diseases as well<sup>(11,12)</sup>. Rh system emerged as second most important blood group system due to hemolytic disease of

newborn and its importance in Rh negative individuals in subsequent transfusions once they develop Rh antibodies<sup>(1)</sup>.

The objective of this study was to assess the relationship between blood groups and hypertension.

#### Materials & method:

This study was carried out on two groups of subjects who are attending general medicine outpatient department in Al-diwaneya teaching hospital & some privit clinic during the period from September2011to October2013. the age range of both group was 35- 70 years of both sexes. The Control group consist of normal 285 healthy subjects ,including 188 males and 97 females.

The patient group consist of 210 patients who are suffering from hypertension of which 125 male & 85 females. regarding the hypertensive group a subject whose blood pressure was more than 140/90 mm Hg were included in the study group Blood pressure was measured with Sphygmomanometer & determination of ABO using antisera was done for each subject.

#### Results :

The data of 495 subject (out of which 210 are hypertensive and the remaining 285 were control), were collected and analyzed statistically by using (chi square & SPSS). the study groups age range from 35- 70 years old, who were randomly selected and examined for their ABO status. The results are shown in tables.

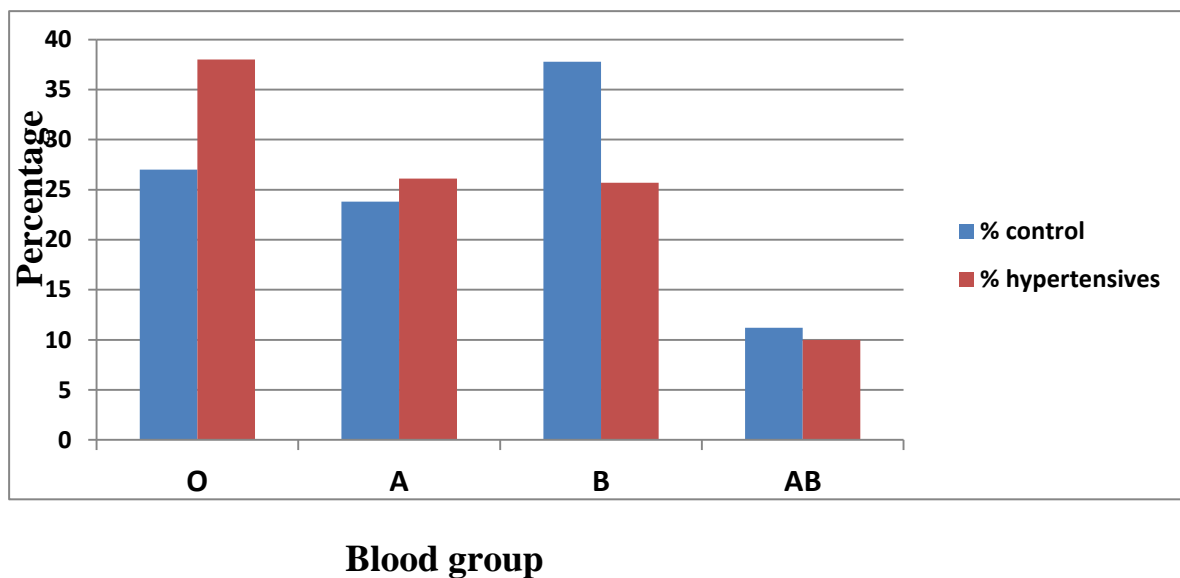
**Table -1:** Distribution of blood groups in control &hypertensives in both sex.

Blood group	Number of control (%)		Number of hypertensives (%)		Total (%)
	Male	Female	Male	Female	
<b>O</b>	51 (27)	26(26.8)	44(35.2)	36(42.3)	157
<b>A</b>	45(23.9)	23(23.7)	32(25.6)	23(27)	123
<b>B</b>	70(37.2)	38.(39.1)	31(24.3)	23(27)	162
<b>AB</b>	22(11.7)	10(10.3)	12(9.6)	9(10.5)	53
<b>Total</b>	188	97	125	85	495

**Table - 2 :** Distribution of blood groups in controls and in hypertensives

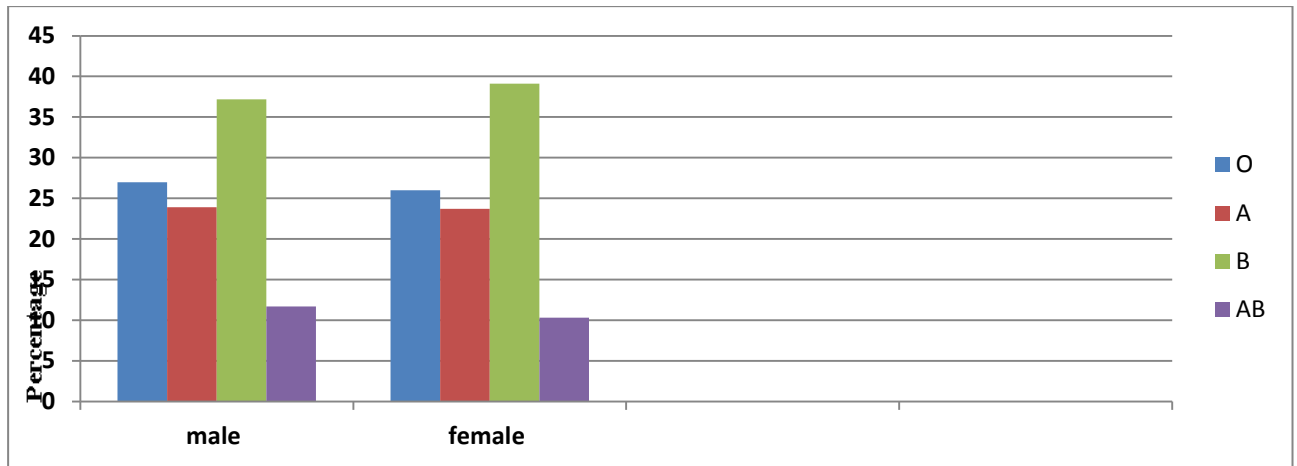
Blood group	Number of control(%)	Number of hypertensives(%)	Total
O	77 (27%)	80(38%)	157
A	68 (23.8%)	55(26.1%)	123
B	108 (37.8%)	54(25.7%)	162
AB	32 (11.2%)	21(10%)	53
<b>TOTAL</b>	285	210	495

Chi-square, = 4.239, df = 3 P value = 0.2368 (alpha<0.05) Not significant.

**Figure (I) :** - % Distribution of blood groups in controls and in hypertensives.**Table(3) :** Distribution of blood groups in control group in both sex.

Number of Control(%)	Blood group (%)				Total
	O	A	B	AB	
Male	51 (27)	45(23.9)	70(37.2)	22(11.7)	188(65.9)
Female	26(26.8)	23(23.7)	38(39.1)	10(10.3)	97(34.03)
<b>Total</b>	77(27)	68(23.8)	108(37.8)	32(11.2)	285

$\chi^2 = 0.2344$  , df = 3 , P value = 0.9718 alpha < 0.05 not significant



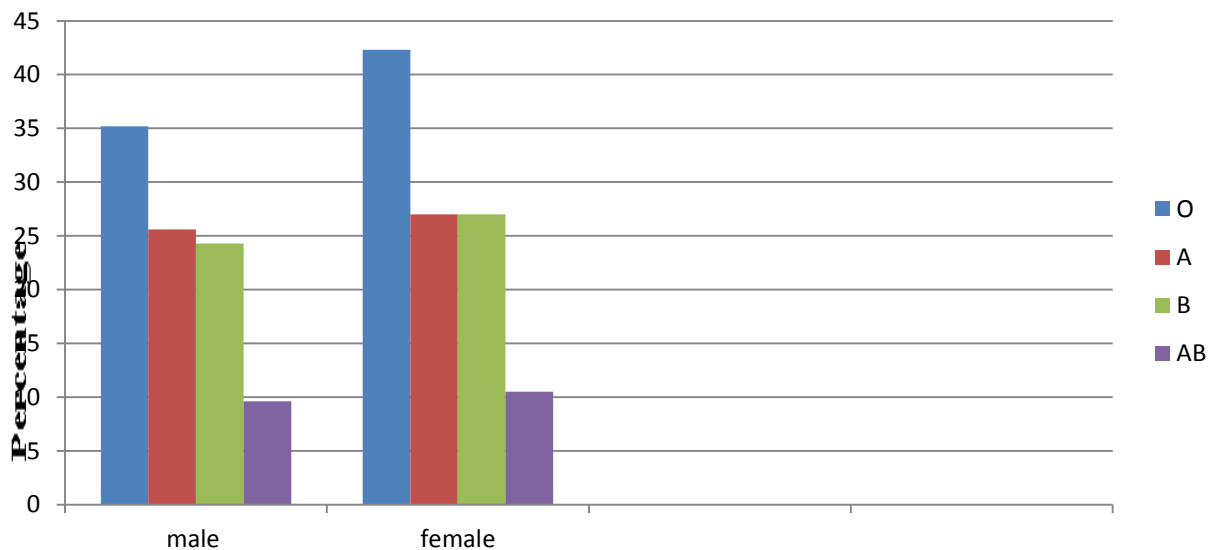
Blood group

Figure 2: Distribution of blood groups in control group in both sex.

Table (4) : Distribution of blood groups in hypertensive group in both sex.

Number of hypertensives (%)	Blood group (%)				Total
	O	A	B	AB	
Male	44( 35.2)	32(25.6)	31(24.3)	12(9.6)	125
Female	36 (42.3)	23(27)	23(27)	9(10.5)	85
Total	80(38)	55(26)	54(25.7)	21(10)	210

$X^2 = 0.156$   $df=3$   $P$  value = 0.984 Statistically not significant



Blood group

Figure 3 : Distribution of blood groups in hypertensives in both sex.

## Discussion :

The present study shows that blood group B is more prevalent among control group than the others ( 37.8%) as shown in table (1,2) , the distribution of ABO group varies in different geographical, ethnic groups & socio- economic groups<sup>(13)</sup>. in Egypt blood group O is most prevalent<sup>(14)</sup> , blood group A in Russian federation<sup>(15)</sup> the commonest in Australians are O & A ,while in African B is commonest<sup>(16)</sup> , in USA 46% show group O , 41% group A, 9% group B & 4% group AB<sup>(17)</sup> , In Saudi Arabia 52% group O<sup>(18)</sup> & according to Iranian study blood group O is the most common (41%)<sup>(19)</sup> . different studies in Iraq shows that blood group O was more prevalent than the others<sup>(20,21,22)</sup> . The present study shows that among hypertensive patients the prevalence of blood group O is more predominant as compared with others followed by A ,B & AB in the order of ( 38%, 26.1%, 25.7% & 10% ) respectively , as shown in (table 1,2, figure 1) but statistically this differences is not significant , this result agreed with Ambareesha K . *et al*<sup>(23)</sup> , who conclude that this result mean that the disease is not genetically related , while Nishi K, Gupta N.k.& Shurma S.C<sup>(24)</sup> reported that a significant difference was present.

Earlier studies observed that individuals of African descent with elevated blood pressure had a significantly higher frequency of low-renin hypertension when compared with European hypertensives . Although the reason for the possible protective effect of the A antigen is not well understood, it may be speculated that since blood pressure is multifactorial, perhaps the ABO antigens play a role by influencing renin levels and affecting plasma angiotensin and aldosterone secretion, thus indirectly influencing arterial pressure<sup>(25)</sup>. Maxwell & Maxwell found that the chances of hypertension in Glasgow were highest in

blood group O patients (53.04%), followed by A then B and lowest were in AB<sup>(26)</sup> .

Previous investigators have reported higher diastolic pressures in subjects with blood group O than in their siblings with other ABO blood types. The importance of genetic factors in familial aggregation of blood pressure level has been shown repeatedly<sup>(24)</sup> . Alam *et al.* observed no significant difference in systolic and diastolic blood pressure among all blood groups<sup>(27)</sup> . A similar studies were done in Iraq & The results of data obtained by W.E. Jassim<sup>(28)</sup> , showed that people with blood group O had higher levels of total cholesterol, glucose and diastolic/systolic blood pressure, followed by group A, B then AB. The differences were more marked in patients with diabetes mellitus, hypercholesterolaemia and hypertension than in the healthy control group. Individuals with group AB who have both A and B antigens were more healthy than other groups

Table( 3,4 ) , figure (2,3) shows that in both control & in hypertensives groups there is statistically no significant difference of various blood group in both sexes i.e inheritance of blood group is not related to gender<sup>(23)</sup> . this agreed with Ambareesha K, et al who reported that sex distribution had no significant association with blood group

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& in hypertensive group it is observed that the incidence of O, A and B blood group is reduced. but it was statistically not significant. ( $P > 0.05$ )<sup>(23)</sup> . & he suggest that hypertension is not related to blood group & any gender.

Nishi K., Gupta N.K. and Sharma S.C<sup>(24)</sup> who reported significant differences existing between 2 sexes within blood group O for systolic pressure' although numerous studies have revealed genetic influences on blood pressures, only recently have genetic influences on physiological mediators been defined and

genetic markers have not been identified<sup>(23)</sup>.

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