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Original article

Association of Maternal ABO and Rh Blood Groups with Demographic and Anthropological Factors in Libya

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Abstract
The ABO and Rh blood types are crucial to transfusion counselling, anthropology, and population genetics. They reveal significant differences in blood types, which can consequently affect the mother's health and the outcome of the pregnancy. There is no information available on the blood types among pregnant Libyan women. The project goals of this study are to gain a deeper understanding of population genetics awareness in the eastern part of the Libyan country by examining the relationship between the ABO and Rh blood types and the sociodemographic characteristics of pregnant women in Derna city and its suburbs, to enhance population genetics awareness. The study was conducted on 5012 pregnant women who were hospitalised on the obstetric ward of Al-Wahda Teaching Hospital. ABO and Rh group phenotypes were determined from EDTA-anticoagulated blood samples using the erythrocyte cell-slide technique. Sociodemographic information was examined from medical records.to determine if there were any correlations with the distribution of blood groups. The SPSS program used the data. An association between ABO phenotypes and some demographic factors, including residence. There were significant differences in the ethnic composition among cities and various suburbs, with O+ being the most prevalent in Derna city and Ain Mara countryside. However, particular areas had more A+ in Al Qubbah city and unique fingerprints of the Qayqab rural area B+ groups than others. Other rural areas also have an ABO fingerprint structure that differs from that of other areas. significant association between blood groups and maternal age (p = 0.043) and gestational age (p = 0.045). Additionally, no association with parity, gravida, or abortion. Domin ABO fingerprints of this study are as follows: O+>A+>B+>AB+>O->A->B->AB-; The prevalence of O+ among population studies and slightly increased Rh-negative rates align with regional genetic patterns, highlighting the importance of personalised management plans. By revealing the distribution of blood types among demographic factors, we can establish a benchmark for managing the national healthcare sector, improve the humanisation of blood bank resources and antenatal care, and contribute to anthropological studies in Libya.
Keywords. ABO, Rh Variables, Social-Demographic Factors, Abortion, Gestational Age.

Introduction

In 1930, the Nobel Prize was awarded to the Austrian immunohematologist Karl Landsteiner, following the ABO blood group system discovered in 1900[1]. He was also recognised for his contribution to the discovery of the Rh system, which he co-discovered with Alexander Wiener in 1940 [1]. Recently, the ABO and Rh systems have solidified their position at the forefront of healthcare management in medical transfusion and forensic medicine[2-4]. They provide reliable personal and geographical information, study community demography, anthropology, forensic pathology, inheritance patterns, and ancestral relationships of human populations, and study evolutionary genetics and disease genetic markers [5,6]. ABO blood type antigens become permanent throughout an individual's lifespan [7], and the distribution of blood types differs across various civilisations, ethnicities, and geographical areas over time [8,9].

Pregnancy and childbirth are two natural life phenomena that increase the parity number of the human community [6,10]. Therefore, the study association, if any, between the maternal ABO and Rh blood grouping systems and demographic factors such as maternal age, number of children, abortion, chance of pregnancy, and resident locality is of interest. That improves understanding of the quality of ethnic groups and genetic variation [5].

A variety of research has been conducted worldwide to determine the prevalence rates of blood types and to examine the relationship between demographic and anthropometric characteristics, such as geographical factors and population boundaries[11]. In fact, in Libya, there is a lack of this type of study, especially for pregnant women. Therefore, we are currently studying the prevalence of maternal blood group types and their association with sociodemographic factors to help understand population probabilities. An understanding of Libyan anthropology is essential for comprehending the structure of Libyan society and the distribution of its tribes, which will contribute to the enhancement of healthcare facilities.

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Methodology

Study Demographics

The present investigation was performed in Al Wahda Teaching Therapeutic Hospital, Derna, northeastern Libya. This health center acts as the chief autoreactive clinic in the city and is actively involved in providing. health and healing services to the citizens of Derna and its districts. The sample population comprised 5012 pregnant cases who were recruited from the obstetrics and gynecology departments of Al Wahda Hospital, Derna. The pregnant cases joined the hospital for normal spontaneous vaginal and caesarean deliveries.

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Sample Size and Population

A total of 5,012 pregnant cases were enrolled in this research. They were recruited from the obstetrics and gynaecology department of Al Wahda Hospital, Derna. The study population reflected a geographic cross-section of women from the urban Derna and its suburban communities, encompassing all cases of both spontaneous vaginal and surgical caesarean deliveries recorded at the facility during the study period.

Study Design and Data Collection

The current research employed a retrospective, descriptive cohort design, with a cohort period spanning four years, from early 2020 to late 2023. A comprehensive review of participant data was obtained from medical records, patient files, handwritten delivery room registries, and laboratory databases.

Laboratory Analysis

3000 microliters of venous blood were withdrawn from admitted cases into an EDTA tube. The ABO and Rh blood phenotyping was resolved by the RBC cell-slide method. This analytical work was performed by a qualified laboratory medicine technologist in the hospital's blood bank unit, as part of routine practice in the clinical laboratory.

Data Analysis

Version 29 of the Statistical Package for Social Sciences (SPSS) software was utilised to compare and evaluate the data. The descriptive statistics presented included the number and percentage distribution of categorical variables, as well as the mean and standard deviation. The chi-square test is used to reveal the difference between the observed and expected data, with values equal to or less than 0.05 considered statistically significant.

Result and Discussion

A current study is underway to investigate the association between the prevalence of maternal blood groups and sociodemographic and anthropological factors among 5012 delivered women admitted to the obstetrics ward at Al Wahda Teaching Hospital. A previous study was conducted among pregnant women in Derna city, which found that the O blood group was observed to be dominant among Libyan mothers[12]. aligning tightly with existing data from North Africa[13], The Levant and the Arabian Peninsula[14, 15], all of which report O+ as the most frequent maternal blood group. Otherwise, the near absence of AB-negative blood groups and other findings is slightly higher in the B+ rate, 19.9% in Derna cities [12], than in southern Europe[16]. Nevertheless, lower than those in southern Asia [17], which reflects genetic cross-pollination in the Mediterranean region. The Rh-negative blood type accounts for approximately 11.27%, representing a slight increase[12], and is notably higher in Europe, particularly among Northern Europeans, where it constitutes 7–15% of the population. The fingerprints of maternal blood groups in Derna cities and suburbs, such as $O^+>A^+>B^+>AB^+>O^-$>A^->B^->AB^-, are described in (Tables 1 and Figure 1).

Observe the results according to residence. A similar observation of this blood group's fingerprint was noted between the city of Derna and the Ain Marra area, located to the southwest of the city. That is, O+>A+>B+>AB+>O- >A- >B- >AB-, and Al Qubbah city, the fingerprint is A+>O+>B+>AB+O- >A- >B- >AB-, while rural areas show unique deviations; there is no AB- in some of the rural areas, like Sousse, Martuba, Khalig el-Bomba, and Lamlouda. The tribal gathering of the inhabitants of the Tamimi rural area, west of Tobruk, had its own distinct character and blood group fingerprint, as it was O+ > A+ > B+ > O- > A- > No AB+, AB-, B-, and Absent Rh negative in the fingerprint of Shahat city, Qayqab, and Dhuhr el Hamer. There are also distinctive blood groups for Libyan mothers in the Ras el Hilal and Athron regions, respectively. That's it: A+ > O+ > B+ > O- > B- > No AB+, AB-, A-, and A+>O+>AB+>B+>AB->No A-, B-, O-. A slight elevation in AB+ was observed in the following areas: surrounding Al Qubbah township, namely, Lamlouda(11.1%), Beit Thamer (14.3%), and Ain Marah (10.30%), as well as the Abraq rural area (11.8%) located east of the city of Shahat, while the Al-Dabusiya rural area, which is located in the northeast of the city of Al Qubbah, represented 7.10% of the AB blood group. And occasional B+ markedly increased in the Qayqab rural area, forming 47.40%.

In some cities, such as Tobruk, Al Bayda, and Benghazi, the sample size was not representative of the population, resulting in inaccurate results. Notably, the results were revealed in the cities of Al Bayda, Tobruk, and Benghazi.

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There are differences between urban and rural areas. The diversity of blood types in cities may have arisen due to migration, mixing, and the rapid population growth in cities compared to the countryside. This matter enhances genetic mixing between communities, while more homogeneous blood type patterns characterise remote communities or those in which relatives mix through consanguineous marriage [6,13].

To some extent, the results of blood group distribution become constant. However, some studies indicate that they change over time due to factors such as wars, migrations, and natural disasters, including Hurricane Daniel, which struck the city of Derna and some neighbouring areas. It may have caused the death of a third of the population and caused the migration of approximately another third. This matter will change the anthropological factors of the geographical area, and we must continue to conduct ongoing research for the years extending after Hurricane Daniel.

Table 2 explores maternal demographic and obstetric variables across blood groups, including maternal age. According to the data, the average maternal age was (mean ± SD) 30.62 years ± 6.04, with ranges of 27.56 and 31.13 years for AB- and O-blood types, respectively. This slight change suggests that maternal blood type does not substantially influence maternal age, a conclusion supported by the P-value of 0.043, which approaches statistical significance, indicating a possible relationship between blood type and specific social or genetic characteristics of pregnant women in the studied population. Except for one study carried out at the University Teaching Hospital in Afula, Israel, which found no significant differences between blood types and mothers' ages at all (p-value of 0.98) [18]. It was unable to locate any studies that support the study of the essence of maternal age during childbirth and its relationship to blood types, either in Middle Eastern cities, Mediterranean basin cities, or African countries.

The overall mean gestational age was approximately mean ±SD (weeks +days) ((38+5) ± (2+1)) across all blood groups, with mild statistically significant differences (P = 0.045). This indicates that there is no direct association between maternal blood group and gestational age at delivery. Analogous findings were reported in a study in Pakistan, which concluded that small gestational age is independent of the maternal blood group type B and blood group A in Thailand[19, 20]. European research, including a Scottish study, has also shown an association between premature delivery rates and maternal blood groups[21]. There is a difference in the findings of Gravida and Parity across maternal blood groups, with both Gravida (P = 0.367) and Parity (P = 0.452) showing no significant difference among the study population.

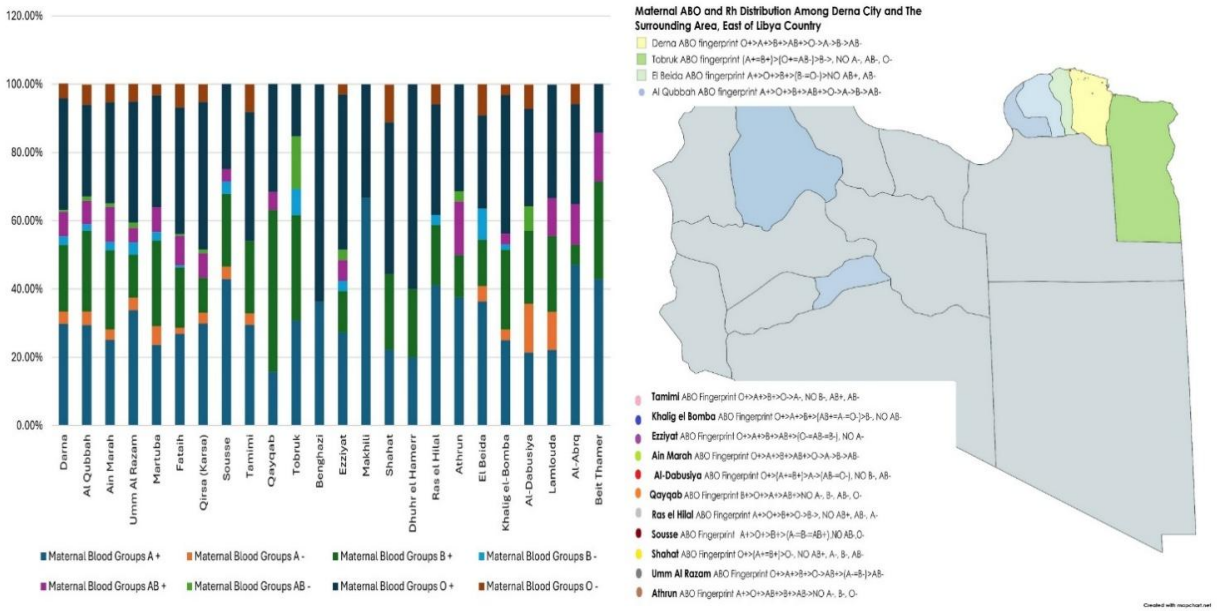

Figure 1. Maternal ABO and Rh Blood Groups Distribution among Derna City and the surrounding area in Eastern Libya

Many international studies, including those in Tunisia and Morocco, as well as Jourdan, reported no evidence of a correlation between blood group and parity or gravidity[22]. Large-scale studies in Europe and the United States have similarly reported no significant connection between blood group type and these obstetric sociodemographic variables [22].

The study revealed an average of 0.63±1.28 abortions. Moreover, no statistical significance was observed among the blood group types (P = 0.278), as explained in (Table 3). However, the study showed that the most incident blood type in miscarriage is blood type O-, with a rate of 38 times. The predominant regional and global literature, which generally asserts that there is no correlation between blood type and rates of spontaneous abortion, save for a few isolated studies lacking thorough validation, might be used to support this assertion [23]. Otherwise, (Table 3) presents the chi-square analysis, which demonstrates a significant relationship between maternal blood types, maternal age, and neonatal outcomes (preterm, term, and post-term), somewhat agreeing with studies in Scotland, Thailand, and Pakistan [19-21].

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The investigation indicates that specific maternal blood group categories, particularly A+, O+, and B+, as well as being prime-aged, which is the most prevalent demographic, correlate with increased risks of premature births. For instance, prime-aged mothers with A+, O+, or B+ blood types exhibit elevated preterm birth rates (A+ prime: 54.6%, O+ prime: 54.1%, B+ prime: 53%) in comparison to the same blood types in the young or advanced age categories. Preterm delivery is a principal cause of neonatal morbidity and death; comprehending the underlying risk factors helps mitigate consequences such as respiratory distress, infections, and developmental deficits in neonates[24]. Table 3 allows healthcare practitioners to categorise pregnant women by risk according to their blood group and age, facilitating customised prenatal care and possible preventive measures. Numerous studies, such as those by Parazzini et al. (2013) and Wang and colleagues (2017), have established analogous relationships, particularly correlating blood groups A and O with an elevated risk of premature delivery, mostly in mothers aged over 30 [25, 26].

According to Global Trend Studies in BJOG (International Journal of Obstetrics and Gynaecology), the type of blood group might be another risk indicator for preterm delivery, particularly when combined with maternal age[27]. Other research (e.g., Smith et al., 2020) has found no significant correlation between maternal blood type and neonatal birth status, instead highlighting other sociodemographic or lifestyle variables [18]. Research sometimes suggests that the role of confounders is that when controlling for socioeconomic status, smoking, and other obstetric risk factors, the influence of blood group diminishes[28]. This data strongly suggests a statistically significant link between a mother's blood type, age, and the status of the birth. This means that blood type and age are important factors in establishing whether a woman is going to have a preterm or post-term delivery. warranting enhanced surveillance and preventative treatment for at-risk pregnant ladies [29]. The results corroborate and enhance an expanding corpus of worldwide research, although certain discrepancies exist, and advocate for the inclusion of blood type and age in prenatal risk assessment methods [30]. The overwhelming majority of published research globally concur that there are no substantial differences across blood types for the demographic and obstetric factors examined. These findings support the prevalent opinion in the scientific community that maternal blood group type has no impact on fundamental demographic or obstetric aspects [31].

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Table 1. Distribution of Maternal ABO and Rh Blood Groups Among Different Residential Areas

Residence		Maternal Blood Groups								Total	P-value	Fingerprint of maternal blood groups
		A +	A -	B +	B -	AB +	AB -	O +	O -			
Darna	No.	858	103	560	71	207	16	940	123	2878	0.000	O+>A+>B+>AB+>O->A->B->AB-
	(%)	29.80%	3.60%	19.50%	2.50%	7.20%	0.60%	32.70%	4.30%	100.00%		
Al Qubbah	No.	199	27	160	13	46	9	182	40	676		A+>O+>B+>AB+>O->A->B->AB-
	(%)	29.40%	4.00%	23.70%	1.90%	6.80%	1.30%	26.90%	5.90%	100.00%		
Ain Marah	No.	51	6	47	5	21	2	60	11	203		O+>A+>B+>AB+>O->A->B->AB-
	(%)	25.10%	3.00%	23.20%	2.50%	10.30%	1.00%	29.60%	5.40%	100.00%		
Umm Al Razam	No.	104	11	39	11	13	5	109	16	308		O+>A+>B+>O->AB+>(A-=B-)>AB-
	(%)	33.80%	3.60%	12.70%	3.60%	4.20%	1.60%	35.40%	5.20%	100.00%		
Martuba	No.	65	15	69	7	20	0	90	9	275		O+>B+>A+>AB+>A->O->B-, NO AB-
	(%)	23.60%	5.50%	25.10%	2.50%	7.30%	0.00%	32.70%	3.30%	100.00%		
Fataih	No.	47	3	31	1	15	1	65	12	175		O+>A+>B+>AB+>O->A->(B-=AB-)
	(%)	26.90%	1.70%	17.70%	0.60%	8.60%	0.60%	37.10%	6.90%	100.00%		
Qirsa (Karsa)	No.	29	3	10	0	7	1	42	5	97		O+>A+>B+>AB+>O->A->AB-, NO B-
	(%)	29.90%	3.10%	10.30%	0.00%	7.20%	1.00%	43.30%	5.20%	100.00%		
Sousse	No.	12	1	6	1	1	0	7	0	28		A+>O+>B+>(AB+=A-=B-)>NO AB-, O-
	(%)	42.90%	3.60%	21.40%	3.60%	3.60%	0.00%	25.00%	0.00%	100.00%		
Tamimi	No.	18	2	13	0	0	0	23	5	61		O+>A+>B+>O->A-, NO B-, AB+, AB-
	(%)	29.50%	3.30%	21.30%	0.00%	0.00%	0.00%	37.70%	8.20%	100.00%		
Qayqab	No.	3	0	9	0	1	0	6	0	19		B+>O+>A+>AB+>NO A-, B-, AB-, O-
	(%)	15.80%	0.00%	47.40%	0.00%	5.30%	0.00%	31.60%	0.00%	100.00%		
Tobruk	No.	4	0	4	1	0	2	2	0	13		(A+=B+)>(O+=AB-)>B->, NO A-, AB-, O-
	(%)	30.80%	0.00%	30.80%	7.70%	0.00%	0.00%	15.40%	0.00%	100.00%		
Benghazi	No.	4	0	0	0	0	0	7	0	11		O+>A+>NO B+, AB+, A-, B-, O-, AB-
	(%)	36.40%	0.00%	0.00%	0.00%	0.00%	0.00%	63.60%	0.00%	100.00%		
Ezziyat	No.	9	0	4	1	2	1	15	1	33		O+>A+>B+>AB+>(O-=AB-=B-), NO A-
	(%)	27.30%	0.00%	12.10%	3.00%	6.10%	3.00%	45.50%	3.00%	100.00%		
Makhili	No.	2	0	0	0	0	0	1	0	3		A+>O+>NO B+, AB+, A-, B-, AB-, O-
	(%)	66.70%	0.00%	0.00%	0.00%	0.00%	0.00%	33.30%	0.00%	100.00%		
Shahat	No.	2	0	2	0	0	0	4	1	9		O+>(A+=B+)>O-, NO AB+, A-, B-, AB-
	(%)	22.20%	0.00%	22.20%	0.00%	0.00%	0.00%	44.40%	11.10%	100.00%		
Dhuhr el Hamer	No.	2	0	2	0	0	0	6	0	10		O+>(A+=B+), NO AB+, A-, B-, AB-, O-
	(%)	20.00%	0.00%	20.00%	0.00%	0.00%	0.00%	60.00%	0.00%	100.00%		
Ras el Hilal	No.	14	0	6	1	0	0	11	2	34		A+>O+>B+>O->B->, NO AB+, AB-, A-
	(%)	41.20%	0.00%	17.60%	2.90%	0.00%	0.00%	32.40%	5.90%	100.00%		
Athrun	No.	12	0	4	0	5	1	10	0	32		A+>O+>AB+>B+>AB->NO A-, B-, O-

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	(%)	37.50%	0.00%	12.50%	0.00%	0.00%	3.10%	31.30%	0.00%	100.00%		
El Beida	No.	8	1	3	2	0	0	6	2	22		A+>O+>B+>(B-=O-)>NO AB+, AB-
	(%)	36.40%	4.50%	13.60%	9.10%	0.00%	0.00%	27.30%	9.10%	100.00%		
Khalig el-Bomba	No.	16	2	15	1	2	0	26	2	64		O+>A+>B+>(AB+=A-=O-)>B-, NO AB-
	(%)	25.00%	3.10%	23.40%	1.60%	3.10%	0.00%	40.60%	3.10%	100.00%		
Al-Dabusiya	No.	3	2	3	0	0	1	4	1	14		O+>(A+=B+)>A->(AB-=O-), NO B-, AB-
	(%)	21.40%	14.3%	21.40%	0.00%	0.00%	7.10%	28.60%	7.10%	100.00%		
Lamlouda	No.	2	1	2	0	1	0	3	0	9		O+>(A+=B+)>AB+>(A=AB-), NO B-, AB-, O-
	(%)	22.20%	11.1%	22.20%	0.00%	11.1%	0.00%	33.30%	0.00%	100.00%		
Al-Abrq	No.	8	0	1	0	2	0	5	1	17		A+>O+>AB+>(B+=O-)>NO A-, B-, AB-
	(%)	47.10%	0.00%	5.90%	0.00%	11.8%	0.00%	29.40%	5.90%	100.00%		
Beit Thamer	No.	3	0	2	0	1	0	1	0	7		A+>B+>(AB+=O+), NO A-, B-, AB-, O-
	(%)	42.90%	0.00%	28.60%	0.00%	14.3%	0.00%	14.30%	0.00%	100.00%		
Another region	No.	4	1	4	1	1	0	2	1	14		A+>O+>(=B+>AB+=A-=B-=O-), NO AB-
	(%)	28.60%	7.14%	28.60%	7.14%	7.14%	0.00%	14.30%	7.14%	100.00%		
Total	No.	1479	178	996	116	345	39	1627	232	5012		O+>A+>B+>AB+>O->A->B->AB-
	(%)	29.50%	3.60%	19.90%	2.30%	6.90%	0.80%	32.50%	4.60%	100.00%		

Calculated value = 354.617 Degrees of freedom = 238 Tabular values 124.34

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Table 2. Comparison of Maternal Demographic and Obstetric Variables Across Blood Groups

		Maternal Age (Years)				**Gestational Age (Week+Day)**				**Gravida**			
		x̄±SD	***95% CI***	***F.value***	***P.value***	***x̄±SD***	***95% CI***	***F.value***	***P.value***	***x̄±SD***	***95% CI***	***F.value***	***P.value***
Maternal Blood groups(N)	A+*(1479)*	30.53±5.91	30.23-30.83	2.069	0.043	(38+4) ± (2+2)	(38+3) -(38.4)	2.05	0.045	4.02±2.59	3.89-4.15	1.089	0.367
	A-*(178)*	30.37±6.28	29.44-31.30			(38+5) ± (2+1)	(38+3) - (38+6)			4.09±2.62	3.70-4.48		
	B+*(996)*	30.76±6.12	30.38-31.14			(38+3) ± (2+2)	(38+1) - (38+4)			3.98±2.65	3.81-4.14		
	B-*(116)*	30.84±5.99	29.74-31.94			(38+5) ± (1+1)	(38+3) - (39+0)			3.93±2.27	3.52-4.35		
	AB+*(345)*	30.98±6.15	30.33-31.64			(38+3) ± (2+0)	(38+2) - (38+5)			4.14±2.66	3.86-4.42		
	AB-*(39)*	27.56±5.91	25.64-29.48			(38+4) ± (2+6)	(37.4) -(39+3)			3.15±2.23	2.43-3.87		
	O+*(1628)*	30.56±6.05	30.26-30.85			(38+4) ± (2+0)	(38+4) - (38+5)			4.12±2.47	4.00-4.24		
	O-*(231)*	31.13±6.00	30.35-31.91			(38+5) ± (2+0)	(38+4) - (39+0)			4.09±2.56	3.76-4.43		
	Total*(5012)*	30.62±6.04	30.45-30.79			(38+5) ± (2+1)	(38+3) - (38+4)			4.05±2.56	3.98-4.12		
		Parity				**Abortion**							
Maternal Blood groups(N)		***x̄±SD***	***95% CI***	***F.value***	***P.value***	***x̄±SD***	***95% CI***	***F.value***	***P.value***	***Minimum***	***Maximum***		
	A+*(1479)*	2.49±2.59	3.89-4.15	0.968	0.452	0.67±1.25	0.61-0.74	1.238	0.278	0	13		
	A-*(178)*	2.19±2.62	3.70-4.48			0.47±0.90	0.33-0.60			0	6		
	B+*(996)*	2.41±2.65	3.81-4.14			0.62±1.11	0.55-0.69			0	14		
	B-*(116)*	2.62±2.27	3.52-4.35			0.71±1.48	0.44-0.98			0	9		
	AB+*(345)*	2.37±2.66	3.86-4.42			0.55±1.04	0.44-0.66			0	9		
	AB-*(39)*	2.69±2.23	2.43-3.87			0.48±1.35	0.04-0.92			0	8		
	O+*(1628)*	2.49±2.47	4.00-4.24			0.62±1.16	0.57-0.68			0	12		
	O-*(231)*	2.35±2.56	3.76-4.43			0.74±2.66	0.39-1.08			0	38		
	Total *(5012)*	2.45±2.56	3.98-4.12			0.63±1.28	0.60-0.67			0	38		

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Table 3. Relationship Between Maternal Blood Groups, Maternal Age Category, and Neonatal Birth Status

Maternal Blood groups	Maternal Age	No (%)	Preterm		Term		Post term		*Chi - Square*
			No	*(%)*	*No*	*(%)*	*No*	*(%)*	
A+	Young	342(23.1)	49	21.7	274	22	7	31.8	<0.001
	Prime	785(53.07)	123	54.6	679	55.1	12	54.5	
	Advanced	352(23.7)	53	23.5	279	23	3	16.6	
	Total	1479(100)	225	15.2	1232	83	22	1.5	
A-	Young	34(19.1)	8	16	35	27	0	0	
	Prime	107(60.1)	21	42	74	59.2	0	0	
	Advanced	37(20.7)	21	42	19	14.8	0	0	
	Total	178(100)	50	28	128	72	0	0	
B+	Young	230(23.1)	36	22	194	23.6	1	11.1	
	Prime	521(52.4)	88	53	428	52.1	4	44.4	
	Advanced	245(24.6)	42	25	199	24.3	4	44.4	
	Total	996(100)	166	16.6	821	82.4	9	0.9	
B-	Young	24(20.6)	5	29.4	24	24.7	0	0	
	Prime	58(50.1)	6	35.3	48	49.5	2	100	
	Advanced	34(29.3)	6	35.3	25	25.8	0	0	
	Total	116(100)	17	14.7	97	83.62	2	1.7	
AB+	Young	66(19.1)	11	23.4	65	21.8	0	0	
	Prime	196(56.8)	22	46.8	159	53.4	0	0	
	Advanced	83(24.1)	14	29.8	74	24.8	0	0	
	Total	345(100)	47	13.6	298	86.4	0	0	
AB-	Young	15(38.5)	3	50	12	37.5	0	0	
	Prime	19(48.7)	2	33.4	16	50	1	100	
	Advanced	5(12.8)	1	16.6	4	12.5	0	0	
	Total	39(100)	6	15.4	32	82.1	1	2.5	
O+	Young	373(22.9)	63	24.7	300	22.4	8	25	
	Prime	848(52.1)	138	54.1	712	53.2	18	56.3	
	Advanced	406(25)	54	21.2	328	24.4	6	18.7	
	Total	1627(100)	255	15.7	1340	82.3	32	2	
O-	Young	54(23.3)	3	12.5	39	19.2	1	20	
	Prime	126(54.3)	13	54.2	115	56.7	4	80	
	Advanced	52(22.4)	8	33.3	49	24.1	0	0	
	Total	232(100)	24	10.4	203	87.5	5	2.1	
Total	Young	1138(22.7)	205	27.9	922	21.9	11	15.5	
	Prime	2686(53.6)	393	53.5	2255	53.6	38	53.5	
	Advanced	1188(23.7)	137	18.6	1029	24.5	22	31	
	Total	5012(100)	735	14.7	4206	84	71	1.4	

**Maternal Age Classification (Young 20 ±5, Prime 30±5, Advanced 40±5)*

Table 4 presents the frequency of abortions and parity status among women according to maternal ABO and Rh blood groups, based on a sample of 5012 women. The frequency of abortion visits is below 3 times for the majority (82.3%). And more than 3 times (7.2%) with no statistical evidence, according to the maternal blood group distribution. However, occasionally AB-negative individuals experienced zero frequencies of abortion more than 3 times. This could potentially be considered, as this blood type is exceptionally uncommon. The slightly higher frequency of abortion among Rh-negative women, particularly A-, is medically relevant. Rh incompatibility can cause haemolytic disease of the fetus/newborn, leading to adverse pregnancy outcomes, particularly in women not receiving anti-D immunoglobulin prophylaxis [32].

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Therefore, ABO and especially Rh type should be carefully considered in prenatal care and counselling. This finding is consistent with numerous studies indicating that there is no strong biological correlation between maternal ABO blood group types and the risk of recurrent miscarriage [33].
Moreover, Parity Status, which indicates that nulliparous participants, who had never given birth before, formed approximately 22% of the total. An otherwise low parity. This was the most common condition, affecting 48.3% of the women, followed by medium parity, which impacted 26% of the women, and then high parity. Only 3.7% of women had high parity. O+ and A+ were again the largest groups across the parity categories. The distribution of parity shows that most women have low to medium fertility. High parity rates are low in the sample, possibly reflecting improvements in maternal healthcare, increased access to contraception, evolving socioeconomic conditions, or growing awareness of family planning (United Nations, 2019)[34]. Medical research links high parity to increased maternal and perinatal risks, such as anaemia, hypertensive disorders, and postpartum haemorrhage [35]. There is no evidence of the effect of maternal blood type distribution on anthropological and sociodemographic characteristics, with one exception: maternal residence.

Table 4. Frequency of Abortion and Parity Status Among Women According to Maternal Blood Groups

Variables	Maternal Blood Groups =n (%)								
	A+	**A-**	**B+**	**B-**	**AB+**	**AB-**	**O+**	**O-**	Total
Abortion	501(28.4)	57(3.3)	342(19.4)	43(2.4)	130(7.4)	6(0.3)	594(33.7)	91(5.2)	1764(35.2)
<3 time	415(82.8)	47(82.4)	285(83.3)	38(88.4)	105(80.7)	5(83.3)	484(81.5)	73(80.2)	1452(82.3)
3 time	49(9.8)	5(8.8)	31(9.1)	3(6.9)	14(10.8)	1(16.7)	68(11.5)	14(15.4)	185(10.5)
>3 times	37(7.4)	5(8.8)	26(7.6)	2(4.7)	11(8.5)	0(0)	42(7.0)	4(4.4)	127(7.2)
Parity	1479(29.5)	178(3.55)	996(19.87)	116(2.3)	345(6.88)	39(0.78)	1627(32.5)	2324(4.63)	5012
0 (Nulliparous)	341(23)	37(20.8)	246(24.7)	21(18.1)	72(20.9)	13(33.3)	323(19.8)	54(23.2)	1107(22.1)
1-3 (Low parity)	700(47.3)	84(47.2)	455(45.7)	68(58.6)	177(51.3)	19(48.7)	806(45.5)	112(48.3)	2421(84.3)
4-6 (Medium parity)	380(25.7)	54(30.3)	254(25.5)	24(20.7)	82(23.8)	6(15.4)	444(27.3)	57(24.6)	1301(26)
High parity=>7	58(4)	3(1.7)	41(4.1)	3(2.6)	14(4.0)	1(2.6)	54(3.3)	9(3.9)	183(3.7)

Conclusion

This retrospective analysis, to our knowledge, provides the first comprehensive assessment of maternal blood group frequencies and their sociodemographic associations among women in labour in the province of Derna, Libya. The predominance of blood group O and Rh-positive status mirrors regional and global trends; however, the variation in blood group frequencies across residential regions highlights the importance of localised genetic diversity and its implications for maternal and newborn care. The research is noteworthy since it emphasises urban centres and their adjacent rural regions. The development of rural communities is markedly slower than that of urban areas. The genetic purity of insular tribal societies, distinguished by unique customs and traditions, including numerous consanguineous marriages, has sparked debate on their preservation of rare blood types, in contrast to densely populated urban areas. The cultural divergence and significant social interactions have led to the accumulation of rare genes. While no significant associations with age, number of births, or miscarriages were found, studies are needed to manage changes in the genetic makeup of the population and to enhance ongoing vigilance in the management of the Rh-negative minority to avoid preventable complications. These data offer critical information for improving prenatal screening and management of blood bank and blood product resources in eastern Libya.

Conflict of interest. Nil

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