Exploring the Relationship Between ABO and Rh(D) Blood Groups and Type 2 Diabetes Mellitus in Libya with Descriptive Findings from Sabratha

Imran Mohamed Saeed El-Mqueteef [1]*, Nahla Gueder [2], Azab Elsayed Azab [3]

[1]Biochemistry Department, Faculty of Medicine, Sabratha University, Sabratha, Libya

[2,3]Physiology Department, Faculty of Medicine, Sabratha University, Sabratha, Libya

* almgatif@sabu.edu.ly, nahla.gweder@sabu.edu.ly, azabelsayed@sabu.edu.ly

[2]https://orcid.org/0009-0008-8392-9793 , [3]https://orcid.org/0000-0002-2974-0219

Abstract

Background: The relationship between ABO/Rh(D) blood groups and diabetes mellitus has been studied in several populations, but findings remain inconsistent. In Libya, available studies differ in design, diabetes classification, control-group selection, and statistical reporting, making it difficult to form a clear national picture. **Objectives:** Critically review Libyan evidence on ABO/Rh(D) blood groups and T2DM and describe their distribution among patients with T2DM in the Sabratha region. **Methods:** A focused narrative literature search was carried out using PubMed, journal publisher websites, DOI records, and Libyan journal archives through 25 October 2026. Where available, information on study design, diabetes classification, sample size, control groups, and reported findings was extracted. Particular attention was paid to the accessibility and consistency of primary-study information. Descriptive analysis was performed on 813 clinic records from Galil Diabetic Centre, Sabratha, collected between September 2025 and September 2026. Frequencies and percentages were calculated, and Wilson 95% confidence intervals were determined for observed proportions. No non-diabetic control group was available. **Results:** Of the 813 clinic records, 500 (61.5%) were female and 313 (38.5%) were male. Blood group A was most frequent (332, 40.8%), followed by B (270, 33.2%), O (180, 22.1%), and AB (31, 3.8%). Rh-positive and Rh-negative records numbered 697 (85.7%) and 116 (14.3%), respectively. The 2025 Libyan systematic review by Abubakeer and Mansour, 2025 reported an association between blood group B and diabetes compared with group O (OR 1.52, 95% CI 1.24–1.86). However, we found an apparent discrepancy between the total number of controls reported in its abstract (900) and the sum of the control groups listed in its study table (2,195). In addition, some original publications included in that review could not be accessed for independent examination. Other Libyan studies also showed limitations in control-group description and statistical reporting. **Conclusion:** The available Libyan evidence suggests a possible relationship between ABO/Rh(D) blood groups and diabetes mellitus, but differences in study methodology and reporting limit definitive interpretation. The 2025 systematic review is an important contribution to the national literature, although clarification of its reported participant totals and further access to the original studies would facilitate independent assessment. The Sabratha results provide descriptive information from a single diabetes clinic and cannot establish an association between blood group phenotype and diabetes susceptibility. Further well-designed Libyan studies using standardised diagnostic criteria and appropriately selected non-diabetic controls are needed.

Keywords: ABO blood groups; Rhesus factor; Type 2 diabetes mellitus; Libya; Sabratha; Narrative review

1. Introduction

Diabetes mellitus remains one of the most important public health problems worldwide. WHO estimates that the number of people living with diabetes rose from about 200 million in 1990 to 830 million in 2022 (WHO, 2024), and the International Diabetes Federation has likewise documented a substantial global burden (IDF, 2025). Type 2 diabetes mellitus (T2DM) is multifactorial: genetic susceptibility interacts with adiposity, physical activity, diet, age, and other clinical and social factors (Zheng *et al.,*2018). An inherited marker may therefore show a statistical association with diabetes without being causally implicated or clinically useful.

The ABO and Rhesus (Rh) systems are among the most extensively studied inherited blood group characteristics. ABO antigens are expressed not only on red blood cells but also on several other tissues, and ABO phenotype correlates with circulating von Willebrand factor and factor VIII levels, which are generally lower in group O than in non-O groups (Franchini *et al.,* 2014). These findings provide a plausible biological background for epidemiological work, but they do not demonstrate a direct causal pathway from ABO phenotype to T2DM.

International evidence is informative but not fully consistent. In the prospective French E3N cohort of 82,104 women, groups A and B were associated with higher T2DM hazards than group O, whereas estimates for group AB and Rh status were not statistically significant (Fagherazzi *et al.,* 2015). A systematic review and meta-analysis of 26 studies reported an association for group B compared with other ABO groups (OR 1.30, 95% CI 1.20–1.41) and a modest inverse association for group O (OR 0.92, 95% CI 0.86–0.98) (Getawa *et al.,*2022). A 2024 umbrella review also judged the evidence for group B versus non-B to be convincing within its assessment framework (OR 1.28, 95% CI 1.17–1.40; I^2 = 13%) (Liu *et al.,*2024). These findings provide useful context, but differences in populations, study designs, and comparator groups mean they cannot be generalized directly to Libya.

Several Libyan studies have examined ABO/Rh(D) distributions among people with diabetes or explored possible associations between blood groups and diabetes. These reports come from Al-Jabal Al-Akhdar, Zintan, Zawiya, Misrata, Al-Marj and Tripoli (Qurtam, 2013a, Qurtam, 2013b, Abubakeer *et al.,* 2024*,* Almabrok *et al.,* 2024*,* Abu Shaala & Asweb, 2024, Hussin, 2026*,* Alshabw *et al.*, 2026), and their findings vary. Their interpretation depends heavily on how diabetes was defined, how participants were selected, whether a non-diabetic comparison group was available, and how statistical analyses were reported. Some Libyan studies describe blood group frequencies among patients already diagnosed with diabetes without including non-diabetic controls. Such studies can provide useful descriptive information, but they cannot establish whether a particular blood group is associated with diabetes susceptibility.

The 2025 systematic review by Abubakeer and Mansour,2025 is an important contribution to the developing national literature. It reported an association between blood group B and diabetes compared with group O (OR 1.52, 95% CI 1.24–1.86) and no statistically significant association for Rh(D) status. The review offers a useful overview of Libyan research. However, independent assessment of its findings is limited by the accessibility of some original reports and by the level of detail available for examining the included studies. There is also an apparent discrepancy between the total number of controls reported in the abstract and the sum of the control groups listed in the study table. These observations underline the importance of transparent reporting and access to primary data when interpreting pooled estimates. They do not, by themselves, establish that the reported association is incorrect.

Other Libyan publications have described ABO/Rh(D) distributions among blood donors and other population groups without specifically investigating diabetes susceptibility (Sakal *et al.* 2019, Regeai, S., & Grenat, 2024). These studies provide useful information on regional blood group patterns, but they involve different study populations and should not be treated as controlled evidence on diabetes risk.

This study aimed to critically review the available Libyan evidence on ABO/Rh(D) blood groups in relation to T2DM, considering the extent to which published studies provide T2DM-specific evidence, and to describe ABO/Rh(D) blood-group distributions among patients with T2DM attending the Galil Diabetic Centre in Sabratha.

2. Literature Search and Evidence Assessment

A focused narrative literature search was conducted through 25 October 2026 to identify published studies examining the relationship between ABO/Rh(D) blood groups and diabetes mellitus in Libya. Sources included

PubMed, journal websites, DOI records, accessible full-text articles, and Libyan journal archives. Relevant search terms covered blood groups, diabetes, and geographical locations across Libya. Retrieved publications were evaluated according to their study design, location, population, sample size, diabetes classification, control groups, blood group distributions, and reported statistical findings. Bibliographic details were cross-checked against available original publications and journal records.

Particular attention was given to the studies included in the 2025 systematic review by Abubakeer and Mansour. Where original articles were unavailable, study characteristics and findings were extracted from the review and could not be independently verified. Reported discrepancies in bibliographic details and participant numbers were considered when interpreting the evidence. Studies without appropriate non-diabetic control groups were treated as descriptive and distinguished from controlled studies assessing diabetes susceptibility.

This review was designed as a focused narrative synthesis rather than a systematic review. No registered protocol, formal risk-of-bias assessment, comprehensive screening flow, or new meta-analysis was undertaken. The findings therefore reflect a critical appraisal of the accessible Libyan literature, with a clear distinction between independently examined primary studies and evidence available only through secondary publications.

3. Libyan Evidence on ABO/Rh(D) and Diabetes

3.1. Primary studies and local reports

Libyan studies investigating the association between type 2 diabetes mellitus (T2DM) and ABO/Rh blood groups vary in their recruitment of control groups, definition of diabetes type, reporting of statistical analyses, and documentation of sample origin. Table 1 summarizes the relevant Libyan publications and their reported findings. The full primary publication was not available for independent examination. Sample size and findings are presented as reported in the 2025 review (Abubakeer & Mansour,2025). Further access to the original report would be helpful for confirming the study characteristics and results. These findings should therefore be interpreted with this limitation in mind.

Table 1. Libyan studies relevant to diabetes and ABO/Rh(D) blood groups.

Study	Findings reported	Critical interpretation
Qurtam (2013), Al-Jabal Al-Akhdar (men (Qurtam,2013a) & women (Qurtam, 2013b)	Reports ABO/Rh distributions and relationships with diabetes categories in male and female patient cohorts.	The patient-only design cannot estimate diabetes susceptibility. The reports include more than one diabetes type, preventing T2DM-specific conclusions.
Elbarsha et al. (2018), Zliten (As cited in review, Abubakeer & Mansour,2025)	The 2025 review reports 450 T2DM cases and 500 controls and states that no statistically significant association was found (Abubakeer & Mansour,2025).	The sample size and findings are based on a secondary review and have not been independently confirmed against the primary source.
Elzouki & Al-Hassan (2020), Tripoli (As cited in review, Abubakeer & Mansour,2025).	The 2025 review reports 650 T2DM cases and 800 controls and an association involving blood group B (Abubakeer & Mansour,2025).	The original diabetes study could not be verified as cited. The reported findings cannot be attributed to an independently confirmed primary source.

Abosedra et al. (2022), Benghazi (As cited in review, (Abubakeer & Mansour,2025).	The 2025 review reports 720 diabetic cases and 850 controls, where cases reportedly included T1DM and T2DM (Abubakeer & Mansour,2025).	The original article was not verified as cited. The data remain secondary-reported and, due to the mixed diabetes types, cannot be treated as verified T2DM-specific evidence.
Abubakeer *et al.,* 2024, Zintan	No statistically significant association between ABO/Rh blood groups and diabetes. Group O was most frequent among diabetic patients.	Although the study included a non-diabetic control group, its small sample (99 diabetics vs 45 controls) and unspecified diabetes type mean the findings cannot be interpreted as T2DM-specific evidence.
Almabrok, *et al*. (2024), Zawia	Diabetics (n=110): O 47.27%, A 26.36%, B 17.27%, AB 9.09%. Controls (n=110): O 54.54%, A 23.63%, B 13.63%, AB 8.18%.	The inclusion of a non-diabetic comparison group is a methodological strength. However, the diabetes type is not specified, meaning findings cannot be isolated to T2DM. Rh(D) is not examined, and critically, the authors report no inferential statistics (p-values) to support their claimed "association" between ABO blood groups and diabetes. The modest sample size (n = 220) and complete reliance on descriptive statistics render the authors' conclusion inconclusive.
Abu Shaala & Asweb (2024), Misrata	In 893 diabetic patients (95 T1DM; 798 T2DM), group O was most frequent (38.7%), followed by A (37.1%), B (17.9%), and AB (6.3%). Rh-positive accounted for 88.0%. No significant association was reported ($p = 0.258$).	While a control group (n=150) is mentioned in the results, its selection and characteristics are not described in the Methods. The $p = 0.258$ lacks a clearly documented diabetic–control analysis. Mixed T1DM/T2DM means findings are not T2DM-specific.
Hussin (2026), Al-Marj, eastern Libya	Group A was most frequent (45.2%), followed by O (31.2%), B (16.9%), and AB (6.6%). Significant differences in mean diabetes duration were observed across ABO groups ($p < 0.001$).	Investigated diabetes duration rather than susceptibility. No healthy control group and no adjustment for confounders (age, diabetes type). The small AB-negative subgroup (n = 55) warrants caution. Provides descriptive evidence but cannot establish an association with diabetes occurrence.
Alshabw *et al.* (2026), Tripoli	Blood group B showed the highest diabetes prevalence (56.5%) and highest mean FBS (149.9 mg/dL). No statistically significant association ($p \approx 0.20$).	Severely constrained by a small sample size (n = 77), resulting in heavily underpowered subgroups (e.g., only 2 diabetic cases in group AB). Normal glycemic participants provided an internal baseline, but the study lacks statistical power to detect true associations or adjust for confounders.

3.2. The 2025 Libyan systematic review: interpretation and reporting considerations

The systematic review and meta-analysis published by Abubakeer and Mansour in 2025 represents an important effort to bring together the available Libyan research on ABO/Rh(D) blood groups and diabetes mellitus. The authors reported a pooled OR of 1.52 (95% CI 1.24–1.86, $p < 0.001$) for blood group B compared with group O, suggesting a possible association between these blood groups and diabetes. For Rh(D) status, the reported OR was 1.08 (95% CI 0.82–1.42, $p = 0.59$), indicating no statistically significant association (Abubakeer & Mansour,2025).

The findings of this review are relevant to the developing national literature. However, independent assessment of the pooled results is limited by the availability of the original publications and the level of detail provided for some included studies. Although the primary studies are cited in the review, their full reports or sufficient study-level data were not available for independent examination in the present review. Consequently, the sample characteristics and findings attributed to these studies have been retained as reported by Abubakeer and Mansour, 2025 rather than treated as independently verified primary data. This limitation concerns the extent of available documentation and should not be interpreted as evidence that the underlying studies were not conducted.

A numerical difference is also apparent in the reported participant totals. The abstract and total row of the 2025 review report 1,919 diabetic cases and 900 controls, giving a total of 2,819 participants. In contrast, the control-group sample sizes listed for the four studies in its Table 1 are 500, 800, 850, and 45, which sum to 2,195 controls. When combined with the reported 1,919 diabetic cases, these figures yield 4,114 participants. The difference between the two reported totals is 1,295 participants.

This difference requires clarification to establish how the overall sample size was derived and how the individual study data contributed to the pooled analysis. Nevertheless, it should be considered a reporting discrepancy that warrants further examination rather than sufficient evidence to reject the reported findings. In particular, the discrepancy alone does not demonstrate that the pooled OR of 1.52 is incorrect.

The reported association between blood group B and diabetes is also consistent in direction with findings from some international evidence syntheses ((Getawa *et al.,*2022, Liu *et al.,*2024). However, differences in study populations, comparison groups, and study methods should be considered when interpreting these findings. Furthermore, independent evaluation of the Libyan pooled estimate would benefit from access to the original reports, complete case and control counts, ABO/Rh(D) distributions, and study-specific effect estimates.

Overall, the 2025 review provides a useful contribution to the discussion of ABO/Rh(D) blood groups and diabetes in Libya. Its findings should be interpreted in light of the available reporting and verification limitations. Further access to the primary publications and clarification of the reported sample-size differences would strengthen the reproducibility and interpretation of its pooled results.

3.3. Libyan blood-group distribution studies that do not estimate diabetes risk

Two further Libyan studies help describe local blood-group frequencies but were not designed to estimate an association with diabetes. They are included for descriptive context and should not be counted as controlled studies of diabetes susceptibility.

Table 2. Libyan blood-group distribution studies included for context only.

Study and setting	Sample	Reported distribution	Interpretation
Sabratha; Sakal *et al.* (2019)	5,356 adult male blood donors; Central Blood Bank, January-June 2019.	O 43.19%; A 34.00%; B 18.13%; AB 4.68%; Rh-positive 83.53%.	Distribution-only reference. All donors were male and were not sampled as controls for the 2026 data from the Galil Diabetic Centre in Sabratha.
Jabal Nafusa and Tripoli; Regeai and Grenat (2024)	5,519 records from Zintan, Alrujban, Jadu, and Tripoli; blood-group distribution and allele-frequency study.	Combined ABO distribution: O 33.68%; A 26.27%; B 21.31%; AB 18.74%; Rh D-positive 68.11%.	Not a diabetes-risk study. Locations, recruitment settings, and source populations differ from the Sabratha study.

3.4. Data collection

The study included 813 records from the Galil Diabetic Centre in Sabratha, collected between September 2025 and September 2026. All records were classified as T2DM cases, comprising 500 females and 313 males. The ABO blood-group distribution was as follows: A (332), B (270), O (180), and AB (31). Rh(D)-stratified counts were A: 287 positive and 45 negative; B: 241 positive and 29 negative; O: 143 positive and 37 negative; and AB: 26 positive and 5 negative. Percentages were calculated from the recorded counts, and Wilson 95% confidence intervals were determined for the proportions presented in the tables and figures. No odds ratios, relative risks, or estimates of diabetes susceptibility were calculated because the clinic dataset did not include an appropriately sampled non-diabetic control group. In addition, the absence of some clinical variables prevented adjustment for potential confounding factors.

3.5. Local blood-donor reference

For descriptive context, clinic frequencies were compared with a published series of 5,356 blood donors recorded at the Central Blood Bank in Sabratha between January and June 2019 (Sakal *et al.* 2019). The source paper states that all donors were male and aged 18 to 65 years. In contrast, the present clinic-based sample included both male and female patients and was collected seven years after the donor survey. The samples were not matched and differed in recruitment setting and calendar period. The donor series was therefore not treated as a control group.

4. DESCRIPTIVE FINDINGS FROM SABRATHA

4.1. Overall and sex-stratified ABO distribution

The Sabratha clinic dataset contained 813 records, of which 500 were female (61.5%) and 313 were male (38.5%). Group A was the most common phenotype, followed in order by B, O, and AB. Non-O groups together accounted for 633 records (77.9%). These proportions describe only the clinic records. They do not estimate ABO/Rh(D) frequencies in the general population of Sabratha and cannot be used to estimate diabetes susceptibility.

Table 3. ABO distribution among records in the Galil Diabetic Centre in Sabratha.

ABO group	Total n	Total %	Overall 95% CI	Females n (%)	Males n (%)
A	332	40.8	37.5-44.3	200 (40.0%)	132 (42.2%)
B	270	33.2	30.1-36.5	170 (34.0%)	100 (31.9%)
O	180	22.1	19.4-25.1	110 (22.0%)	70 (22.4%)
AB	31	3.8	2.7-5.4	20 (4.0%)	11 (3.5%)
Non-O	633	77.9	74.9-80.6	390 (78.0%)	243 (77.6%)
Total	813	100.0	-	500 (100.0%)	313 (100.0%)

Group A represented 40.0% of female records and 42.2% of male records. Group B represented 34.0% of female records and 31.9% of male records. The proportions are descriptive; no formal comparison by sex was conducted and no conclusion about sex-specific susceptibility can be drawn.

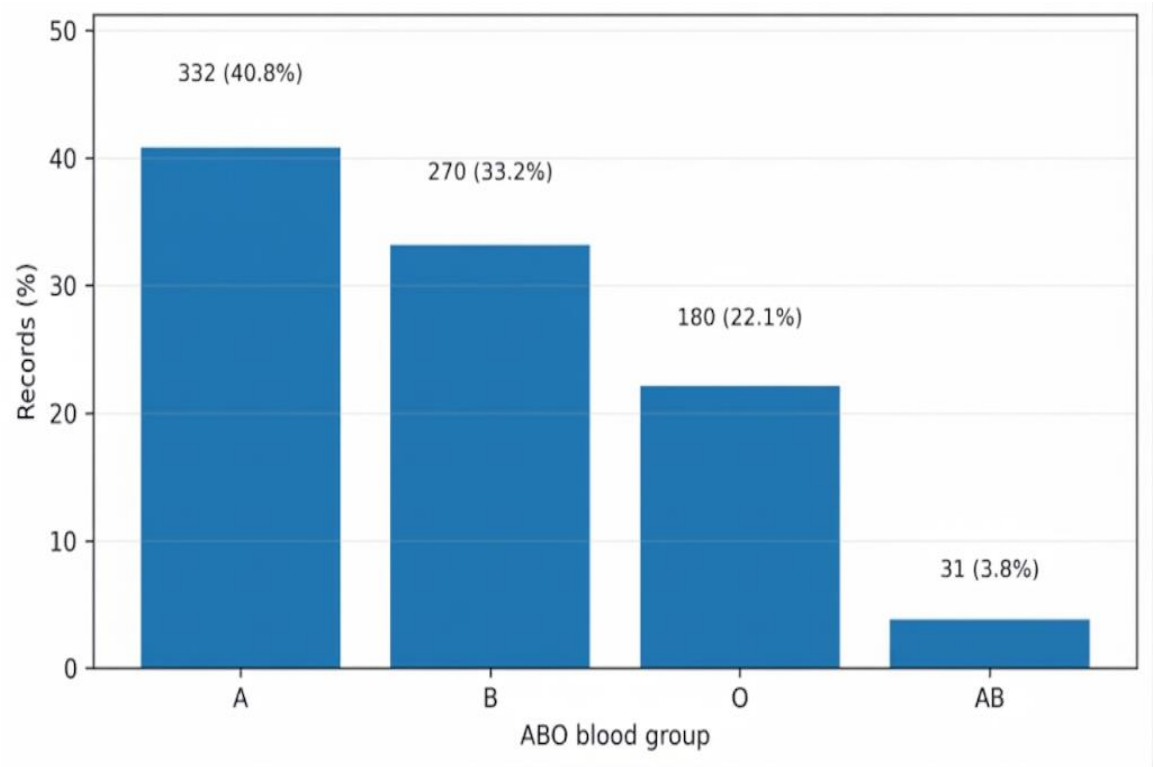


Figure 1. Overall, ABO distribution in the Galil Diabetic Centre in Sabratha

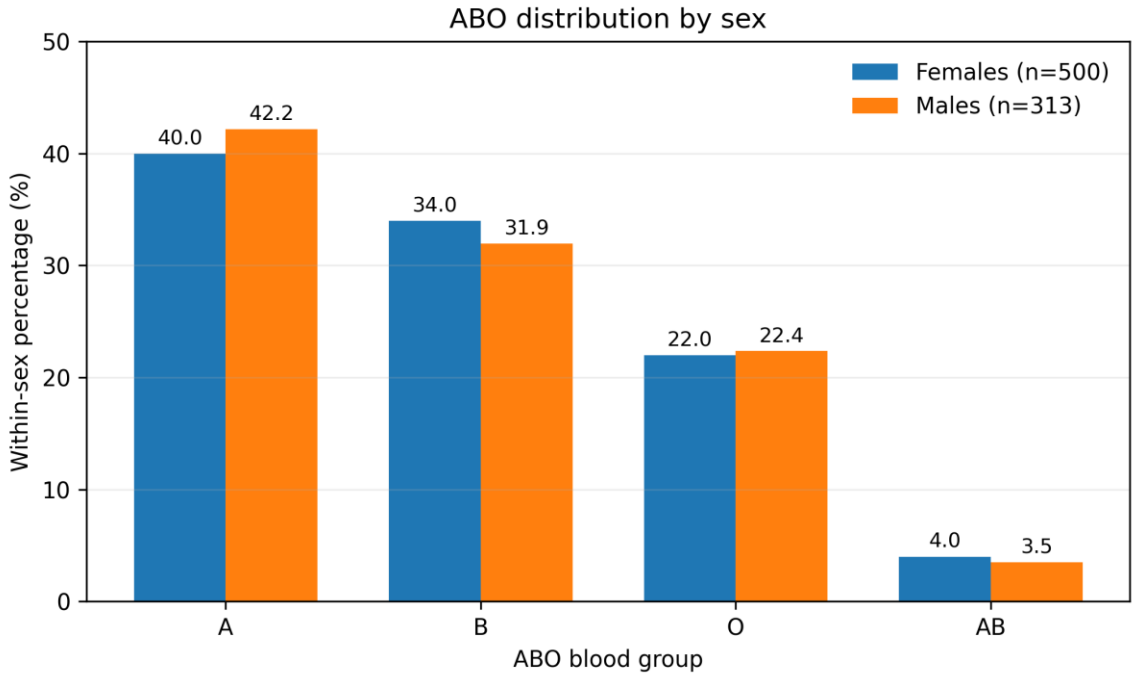


Figure 2. ABO distribution by sex. Percentages use the sex-specific denominators of 500 females and 313 males.

4.2. Rh(D) distribution

The Rh(D) counts indicated 697 Rh-positive records (85.7%) and 116 Rh-negative records (14.3%). Rh positivity ranged from 79.4% in group O to 89.3% in group B. These proportions do not establish whether Rh status is associated with diabetes occurrence.

Table 4. Rh(D) counts and proportions within ABO groups in the Sabratha clinic .

ABO group	Total n	Rh-positive n (%)	Rh-negative n (%)	95% CI for Rh-positive
A	332	287 (86.4%)	45 (13.6%)	82.3-89.7
B	270	241 (89.3%)	29 (10.7%)	85.0-92.4
O	180	143 (79.4%)	37 (20.6%)	73.0-84.7
AB	31	26 (83.9%)	5 (16.1%)	67.4-92.9
Total	813	697 (85.7%)	116 (14.3%)	83.2-88.0

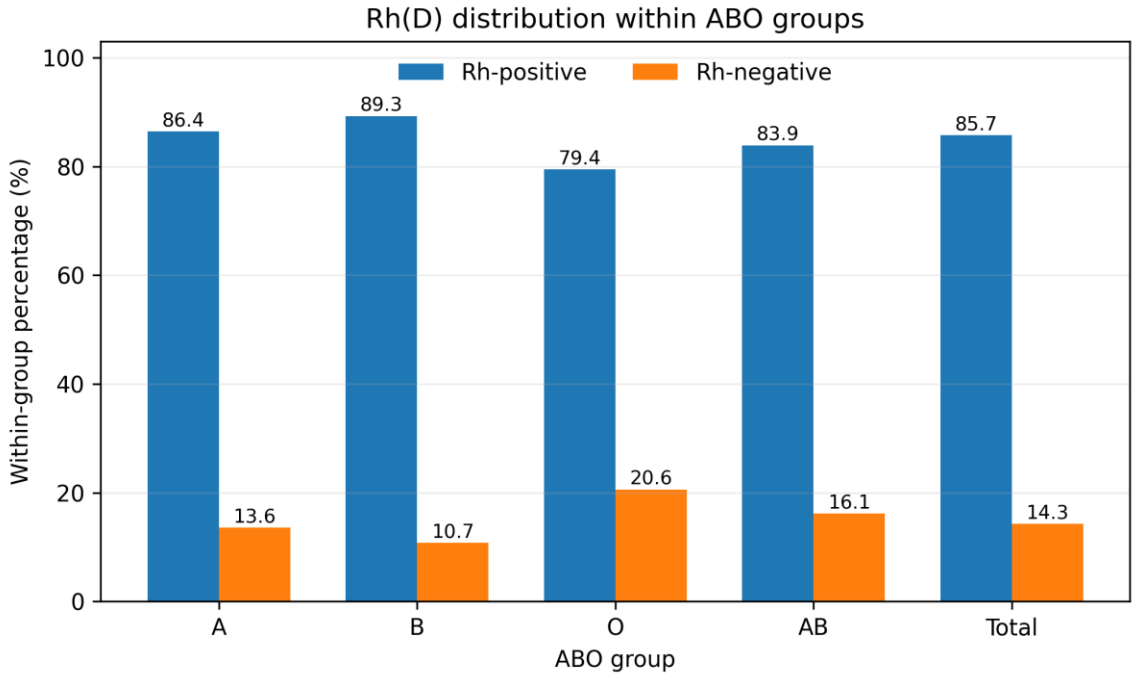


Figure 3. Rh-positive and Rh-negative proportions within each ABO group. Labels show within-group percentages; counts are reported in Table 4.

4.3. Descriptive comparison with the 2019 Sabratha donor series

Compared with the donor series, group O was less frequent in the Galil Diabetic Centre in Sabratha (22.1% versus 43.19%), while groups A and B were more frequent. The observed differences may reflect the sex composition of the samples, donor eligibility, selection into care, calendar period, or other sampling factors. They must not be interpreted as evidence that group A or B predisposes to diabetes or that group O is protective (Sakal *et al.* 2019).

Table 5. Descriptive comparison between the Galil Diabetic Centre in Sabratha and the 2019 blood-donor series.

Group	Clinic records n=813 (%)	Donors n=5,356 (%)	Difference (percentage points)
A	40.8	34.00	+6.8
B	33.2	18.13	+15.1
O	22.1	43.19	-21.0
AB	3.8	4.68	-0.9
Non-O	77.9	56.81	+21.0

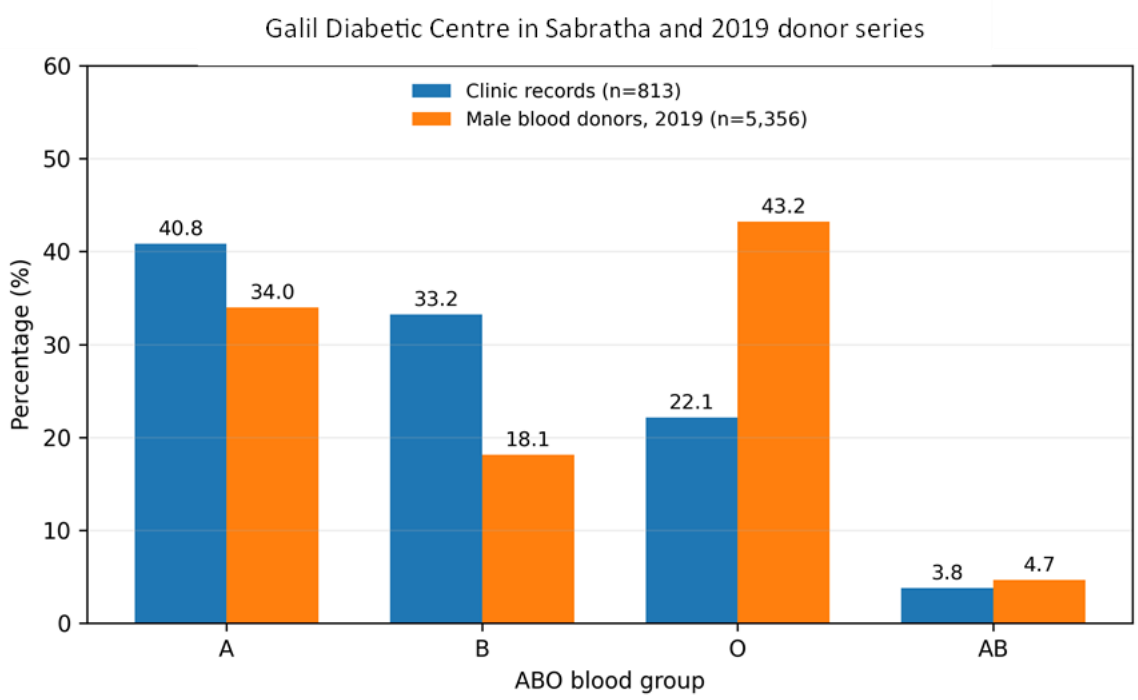


Figure 4. ABO frequencies in the Sabratha clinic records compared with the 2019 donor series.

The donor series comprised adult males only. This unmatched comparison is descriptive and not a case-control analysis.

5. DISCUSSION

The present review highlights the variability of Libyan studies investigating ABO/Rh(D) blood groups and diabetes mellitus. Differences in study design, diabetes type, population selection, and availability of control groups make direct comparisons difficult. The two studies by Qurtam, 2013a, Qurtam, 2013b, for example, described blood group distributions among male and female diabetic patients in Al Jabal Al Akhdar. However, their patient based design does not allow conclusions regarding diabetes susceptibility.

The 2025 national review by Abubakeer and Mansour, 2025 reported an association between blood group B and diabetes (OR 1.52, 95% CI 1.24 to 1.86), while no significant association was found for Rh(D). This finding is of interest and is broadly consistent with some international evidence (Getawa *et al.,*2022, Liu *et al.,*2024). Nevertheless, differences between the reported overall sample size and the study level control counts limit independent verification of the pooled estimate. These discrepancies do not necessarily invalidate the reported association, but they indicate the need for careful interpretation and further confirmation using the original study data.

Findings from individual Libyan studies also vary. The Zintan study (Almabrok *et al.,* 2024) reported no significant overall association between ABO/Rh(D) groups and diabetes, although some details in its statistical tables require clarification. In Zawiya, Almabrok *et al.*, 2024 included 110 diabetic patients and 110 controls. Group O was the most frequent in both groups, while the authors reported a relationship between blood groups and diabetes without providing sufficient statistical details to assess the finding independently. Similarly, the Misrata study (Abu Shaala & Asweb, 2024), which included patients with both type 1 and type 2 diabetes, reported no statistically significant association ($p = 0.258$). However, the presentation of control group data limits independent assessment of its results. Similarly, the Tripoli study by Alshabw *et al.,* 2026 reported the

highest diabetes prevalence and mean fasting blood glucose in blood group B. However, the association was not statistically significant, and the small sample size limited the interpretation of its findings

The more recent study from Al Marj by Hussin, 2026 included 4,361 diabetic patients and reported differences in diabetes duration across ABO groups. Although this provides additional information about the possible relationship between blood groups and disease characteristics, its findings concern disease duration among individuals already diagnosed with diabetes rather than susceptibility to developing diabetes. Therefore, they should be interpreted separately from case control studies investigating disease occurrence. The additional distribution studies provide useful geographical context. Sakal *et al.*, 2019 reported the ABO and Rh(D) frequencies among blood donors in Sabratha, while Regeai and Grenat, 2024 described blood group distributions across several locations in the Jabal Nafusa and Tripoli regions. These studies contribute to the understanding of regional blood group variation but were not designed to investigate diabetes susceptibility.

In the present Sabratha study, group A was the most frequent (40.8%), followed by B (33.2%), O (22.1%), and AB (3.8%), while 85.7% of records were Rh positive. Although group O was less frequent in the clinic records than in the 2019 blood donor series, this difference should be interpreted cautiously because the populations differed in sex composition, recruitment setting, and collection period (Sakal *et al.*, 2019). The absence of a comparable non diabetic control group also prevents an assessment of whether these distributions are associated with diabetes.

Overall, the available Libyan evidence remains insufficient to establish a consistent relationship between ABO/Rh(D) blood groups and diabetes mellitus. Further multicentre studies involving clearly defined diabetes types, appropriately matched controls, and standardised statistical analyses are needed to clarify these findings. At present, ABO/Rh(D) blood groups should not be considered independent markers for diabetes screening or risk prediction.

6. LIMITATIONS AND RESEARCH PRIORITIES

This study has several limitations. The clinical data were obtained retrospectively from a single diabetes clinic in Sabratha, which may limit generalisability. Some clinical information, including diabetes duration, BMI, HbA1c, and family history, was not consistently available, restricting further clinical analysis. In addition, the absence of a non-diabetic control group meant that comparisons with the 2019 blood donor data were descriptive only and could not be used to assess associations.

The literature review was narrative in nature, and full text access to some relevant Libyan studies (Abubakeer *et al.*, 2024, Almabrok *et al.*, 2024, Abu Shaala & Asweb, 2024) was limited, which prevented independent verification of all reported details. The 2025 review (Abubakeer & Mansour,2025) provided useful additional evidence, although some differences in the reported sample figures could not be fully clarified. Variations in study design and population characteristics also limited direct comparisons and quantitative synthesis.

Despite these limitations, the study provides an overview of the available Libyan evidence and highlights the need for further multicentre research using comparable study populations and appropriate control groups.

7. CONCLUSION

Published Libyan studies provide useful but heterogeneous evidence on the relationship between ABO/Rh(D) blood groups and diabetes mellitus. Differences in study design, diabetes classification, control-group selection, and statistical reporting should be weighed carefully when interpreting their findings. The 2025 systematic review by Abubakeer and Mansour, 2025 is an important contribution to the national literature and reports an association between blood group B and diabetes. Further access to the original studies and clarification of the reported participant totals would strengthen independent assessment of this finding.

In the Sabratha clinic records, blood group A was the most frequent ABO phenotype, and 85.7% of records were Rh-positive. These findings, however, come from a single-centre clinical dataset with no appropriately sampled non-diabetic comparison group and therefore cannot establish an association between blood group phenotype and diabetes susceptibility.

Future Libyan studies should adopt standardised diabetes definitions, appropriately selected control groups, adequate sample sizes, and transparent statistical reporting. Further well-designed investigations are needed before ABO/Rh(D) blood groups can be considered relevant independent markers of diabetes risk or used in clinical risk assessment.

DECLARATIONS

The authors declare no conflict of interest.

References

Abu Shaala, Y., & Asweb, A. (2024). Frequency of blood groups in patients with diabetes mellitus. AlQalam Journal of Medical and Applied Sciences, 7(3), 778–783. https://doi.org/10.54361/ajmas.247345

Abubakeer, A. M. A., Salem, R. A., Ali, A. M., & Mohammed, A. A. (2024). The distribution of the ABO and rhesus blood groups among diabetes mellitus patients in Zintan City, Libya. Farmasains: Jurnal Farmasi dan Ilmu Kesehatan, 9(2), 53–58. https://doi.org/10.22219/farmasains.v9i2.35286

Abubakeer, A., & Mansour, N. (2025). The association between ABO and Rhesus blood groups and diabetes mellitus in Libya: A systematic review of national evidence. Razi Medical Journal, 1(3), 267–271. https://doi.org/10.69667/rmj.25325

Almabrok, M. A. M., Ashour, A. A. A., & Taweel, A. K. A. (2024). Study of the distribution of blood groups (ABO) in a sample of diabetics patients in the Al-Zawia region. International Science and Technology Journal, 33(Part 2), 1–12. https://stcrs.com.ly/istj/docs/volumes/Blood%20Groups.pdf

Alshabw, O., Alkelani, S., Alhbashi, D., & Alshneiti, A. (2026). The relationship between diabetes and blood group: A comparative analytical study. Rowad Alelm Journal of Science, 1(2), 56–61. https://https://doi.org/10.5281/td405w60

Fagherazzi, G., Gusto, G., Clavel-Chapelon, F., Balkau, B., & Bonnet, F. (2015). ABO and Rhesus blood groups and risk of type 2 diabetes: Evidence from the large E3N cohort study. Diabetologia, 58(3), 519–522. https://doi.org/10.1007/s00125-014-3472-9

Franchini, M., Crestani, S., Frattini, F., Sissa, C., & Bonfanti, C. (2014). ABO blood group and von Willebrand factor: Biological implications. Clinical Chemistry and Laboratory Medicine, 52(9), 1273–1276. https://doi.org/10.1515/cclm-2014-0564

Getawa, S., Bayleyegn, B., Aynalem, M., Worku, Y. B., & Adane, T. (2022). Relationships of ABO and Rhesus blood groups with type 2 diabetes mellitus: A systematic review and meta-analysis. Journal of International Medical Research, 50(10), Article 3000605221129547. https://doi.org/10.1177/03000605221129547

Hussin, H. (2026). Association between ABO blood groups and diabetes duration: A large cross-sectional study from Al-Marj City, Eastern Libya. African Journal of Advanced Pure and Applied Sciences, 5(3), 238–247. https://doi.org/10.65418/ajapas.v5i3.2129

IDF (International Diabetes Federation). (2025). IDF diabetes atlas (11th ed.). https://diabetesatlas.org/resources/idf-diabetes-atlas-2025/

Liu, F.-H., Guo, J.-K., Xing, W.-Y., Bai, X.-L., Chang, Y.-J., Lu, Z., Yang, M., Yang, Y., Li, W.-J., Jia, X.-X., Zhang, T., Yang, J., Chen, J.-T., Gao, S., Wu, L., Zhang, D.-Y., Liu, C., Gong, T.-T., & Wu, Q.-J. (2024). ABO and Rhesus blood groups and multiple health outcomes: An umbrella review of systematic reviews with meta-analyses of observational studies. BMC Medicine, 22, Article 206. https://doi.org/10.1186/s12916-024-03423-x

Qurtam, A. A. (2013). Association between blood groups/Rhesus factor and diabetic incidence of male in Aljabal Alkhdar in Libya. Journal of Food and Dairy Sciences, 4(5), 217–222. https://jfds.journals.ekb.eg/article_71829_38e52d06767b2c87ffb5a37b640c9385.pdf

Qurtam, A. A. (2013b). Interrelation between blood groups/Rhesus factor and diabetic incidence of female in Ajabal Alakhdar in Libya. Journal of Food and Dairy Sciences, 4(8), 423–431. https://doi.org/10.21608/jfds.2013.72083

Regeai, S., & Grenat, S. (2024). Gene frequency and prevalence of ABO and Rh D blood group systems among Libyan donors and patients of Jabal Nafusa region, Libya. AlQalam Journal of Medical and Applied Sciences, 7(4), 1350–1362. https://doi.org/10.54361/ajmas.247463

Sakal, I. D. A., Emberesh, R. A., Alhamoudi, A. A., Habbah, S. T., & Waddan, M. A. (2019). Prevalence and distribution of ABO and Rh(D) factor among blood donors in Sabratha-Libya. Haya: The Saudi Journal of Life Sciences, 4(9), 283–286. https://doi.org/10.36348/SJLS.2019.v04i09.001

WHO (World Health Organization). (2024, November 14). Diabetes. https://www.who.int/news-room/fact-sheets/detail/diabetes

Zheng, Y., Ley, S. H., & Hu, F. B. (2018). Global aetiology and epidemiology of type 2 diabetes mellitus and its complications. Nature Reviews Endocrinology, 14(2), 88–98. https://doi.org/10.1038/nrendo.2017.151