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The Effect of HbA1c level on Post-Operative Complications Following Rotator Cuff Tear Repair Surgery: A Meta-Analysis Study

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Abstract

Introduction: Rotator cuff repair is a widely performed orthopedic surgical procedure to ease pain and restore shoulder movement in individuals with tears in the rotator cuff. This meta-analysis examined the relationship between preoperative HbA1c levels and susceptibility to postoperative complications following rotator cuff tear repair surgery.

Methods: A systematic review and meta-analysis were conducted following PRISMA guidelines. Relevant studies published until July 2023 were identified across multiple databases.

Results: The meta-analysis included 14 articles (3 prospective, 11 retrospective) with 113,286 diabetic and 342,895 non-diabetic patients. Diabetic patients were slightly older on average. There were more males and smokers in the non-diabetic group, while the diabetic group had more hypertensive patients. Diabetic patients had worse outcomes, including higher rates of rotator cuff retears (RR 1.62;95%1.27, 2.06; P<0.001). Non-diabetic patients generally achieved better healing (OR;2.68;95%CI;1.45,4.95;P=0.002), pain, and range of motion improvements. Diabetes did not significantly impact infection risk or hospital utilization.

Conclusions: The findings suggest that optimizing glycemic control in diabetic patients may be important for improving outcomes following rotator cuff repair. This opens new avenues for research to understand the mechanisms driving the differences in outcomes between diabetic and non-diabetic patients. Developing strategies to minimize the negative impact of diabetes on rotator cuff injuries and repair procedures could be beneficial.

Introduction

Rotator cuff repair is a widely performed orthopedic surgical procedure to ease pain and restore shoulder movement in individuals with tears in the rotator cuff.[1] This procedure aims to reattach the damaged tendon to the upper arm bone, allowing for improved shoulder function and decreased discomfort. However, postoperative complications can occur, leading to suboptimal outcomes.[2] These complications can include stiffness, limited range of motion, surgical site infections, and poor functional recovery, which can significantly impact the patient's quality of life and overall treatment success. One potential factor that may influence the occurrence of these complications is the level of glycated hemoglobin (HbA1c), a commonly used marker for assessing diabetic control.[3] Elevated HbA1c levels have been associated with an increased risk of various postoperative complications in different patient populations.[4,5] For instance, a prospective cohort study by Park et al. (2017) involving 187 patients who underwent arthroscopic rotator cuff repair found that elevated preoperative HbA1c readings were highly linked to postoperative complications such as stiffness and limitation for the range of motion. [6] Previously published systematic reviews revealed poor surgical and functional outcomes of rotator cuff repair among diabetic patients.[6-8] However, these studies are limited with considerable heterogeneity and a limited number of included patients, limiting the ability to quantify the data accurately. This highlighted the need to reveal the impact of HBA1C levels and diabetic studies on the outcomes of rotator cuff tears. Therefore, this systematic review was designed to summarize the data reported in the literature on the surgical and functional outcomes of rotator cuff tears among patients with elevated HBA1C levels. Such evidence is mandated to alleviate the poor outcomes of rotator cuff tear surgeries by adopting timely and effective care for diabetic patients seeking rotator cuff repair surgery.

Materials and Methods

Methods

This systematic review was carried out following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines[9] and the Cochrane collaboration recommendations.[10]

Data Source

An extensive literature search was performed from inception to 28 April 2024, using the following databases: PubMed, Google Scholar, Web of Science (ISI), Scopus, and Cochrane Collaboration. No restrictions were employed on patients' age, sex, ethnicity, language, race, or place.

The search strategy implemented controlled vocabulary terms under the criteria of each searched database. The medical subject headings and text words were used to ensure that a considerable range of relevant articles were evaluated. The following keywords were used in every possible combination; 'HbA1c', 'Diabetic', 'Diabetes', 'Rotator cuffs', 'Rotator cuff'. A further manual search was performed to distinguish all additional conceivable articles that were not indexed.

Study Selection

All comparative clinical studies that included patients with rotator cuff tear and evaluated the impact of diabetes mellites or HBAC levels of the outcomes of rotator cuff tear surgery were included. No restrictions were implemented on the patient's age, sex, race, or place. Single arm studies and studies with irrelevant outcomes were excluded. Furthermore, studies in which data was unattainable to be extracted, review articles, non-human studies, guidelines, case reports, letters, editorials, posters, comments, and book chapters were excluded. Two reviewers performed the title, abstract, and full-text screening process to disclose the potentially relevant articles that met the eligibility criteria. The discussion dissolved the contradiction between the reviewers. The screening process and the causes of article exclusion were documented using PRISMA Flowchart.

Data Extraction and Quality Assessment

Two reviewers extracted the data in a well-structured Microsoft excel spreadsheet. The following study characteristics data were extracted from the finally included articles; the title of the included studies, the second name of the first author, publication year, study design, study period, and study region. Baseline patients' demographic characteristic, the surgery -related data, and the outcomes of rotator cuff tears were extracted. The quality of the observational studies was estimated using the National Institute of Health (NIH) quality assessment tool.[11] The studies were assorted into good, fair, and bad when the score was <65%, 30-65%, and> 30%, respectively.

Statistical Analysis

Standardized mean difference (SMD) or weighted mean difference (WMD) was used for pooling the continuous data. Data reported in the form of mean and range or median and range or mean and 95% CI were converted to mean and standard deviation (SD).[12] The risk ratio (RR) or odds ratio (OR) and their 95% confidence interval (95%CI) was used for reporting the dichotomous outcomes. Pooled sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and their 95% confidence intervals (CI) were calculated as a whole and were displayed as forest plots. The fixed-effect model was used when the homogeneity between the eligible studies was revealed. Conversely, the random-effects model was used. Statistical heterogeneity was assessed using Higgins I^2 statistic, at the value of > 50%, and the Cochrane Q (Chi^2 test), at the value of $p < 0.10$.[13] Data analysis was performed using Review Manager version 5.4 and Comprehensive Meta-Analysis v3 software.[14,15] The significance was established when the result of probability value (P)< 0.05. The diagnostic test accuracy meta-analysis was performed using Metadisc Software version 1.4.[16]

Results

A systematic search of the literature revealed 160 articles. Of them, 47 articles were removed as duplicates, resulting in 113 studies, including for title and abstract screening. Furthermore, 78 articles were excluded, and 35 studies were included for full-text screening. Finally, 14 studies were included for systematic review and meta-analysis. (Figure 1)

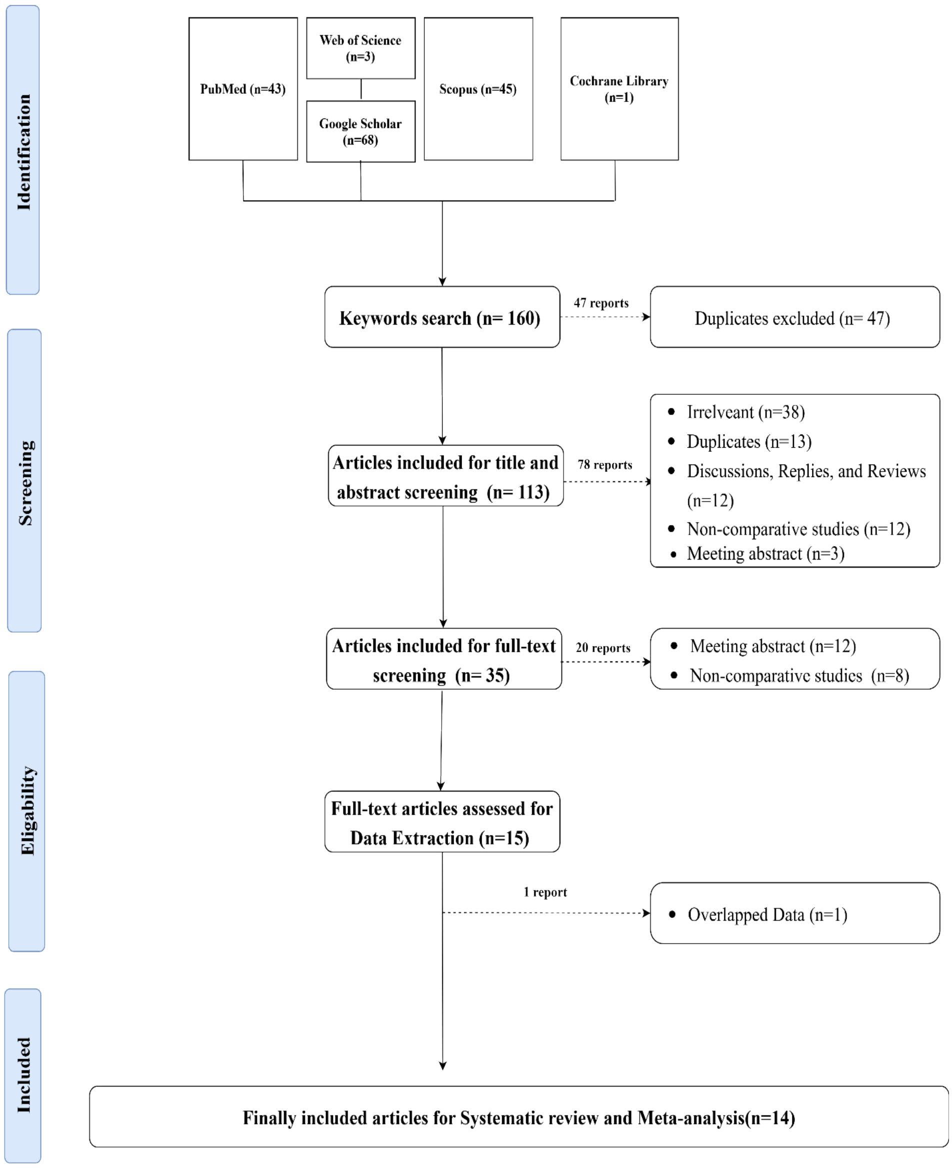

Figure 1: PRISMA Flow chart showing the process of the literature search, title, abstract, and full text screening, systematic review, and meta-analysis.

Demographic characteristics of the included studies

The present meta-analysis included 14 articles.[3,5,17-28] There were three prospective studies and eleven retrospective articles. Six articles included patients from the USA. There were 113286 diabetics and 342895 nondiabetic patients. The average age of the included patents ranged from 56.3 to 66.4 and from 53.5 to 64.1 years among the diabetic and the non-diabetic groups, respectively. There were 191107 males and 156435 females among the non-diabetic group. There were 678 smokers among the diabetic group and 197 patients among the non-diabetic group. There were 40242 hypertensive patients among the diabetic group and 51899 hypertensive patients among the non-diabetic group. The right shoulder was affected among 116 patients within the diabetic group and 461 among the non-diabetic group. The average preoperative forward flexion ranged from 78.3 to 127.5 among the diabetic group and from 105.7 to 129 among the non-diabetic group. The average follow-up period ranged from one month to 24.8 months among the diabetic group and from one month to 27.8 months among the non-diabetic group. (Table 1)

Study Outcomes (Table 2)

Post-operative Complications

Infection

The risk of infection was evaluated among 278067 patients within five studies.[5,18,19,21,26] Pooling the data in the random-effects model (I^2=95%, P<0.001) revealed no statistically significant association between diabetes and the risk of infection (RR 0.70; 95% 0.20, 2.49; P=0.58).

Table 1: Demographic characteristics of the included studies

Study ID		Study Region	Study Design	Study Period	Intervention	Sample Size		Age		Gender				Comorbidities				Shoulder Affection						Passive ROM Forward flexion		Follow-up Period	
										Male		Female		Smoking		Hypertension		Right		Left		Dominant Side					
						Diabetic	Non-Diabetic	Diabetic	Non-Diabetic	Diabetic	Non-Diabetic	Diabetic	Non-Diabetic	Diabetic	Non-Diabetic	Diabetic	Non-Diabetic	Diabetic	Non-Diabetic	Diabetic	Non-Diabetic	Diabetic	Non-Diabetic	Diabetic	Non-Diabetic	Diabetic	Non-Diabetic
						Number	Number	Mean±SD	Mean±SD	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Mean±SD	Mean±SD		
1	Borton et al., 2020[18]	UK	Retrospective	January 2011 to December 2014	Arthroscopic	57	405	66.4 (58.3–72.6)	62.2 (54.1–69.3)	29	244	28	161	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR			5.80 (4.82–6.35)	5.57 (4.67–6.35)
2	Cerri-Droz et al., 2023[19]	USA	Retrospective	2015 and 2020	Arthroscopic	6575	33302	NR	NR	3896	19,762	2659	13529	665	143	5147	12772	41	187	23	84	53	225			30 Days	
3	Cho et al., 2015[20]	Korea	Prospective	January 2006 to June 2012	Arthroscopic	64	271	58.2 (51-75)	57.7 (42-74)	35	141	29	130	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR			24.8 (12-55)	27.8 (12-62)
4	Clement et al., 2010[21]	UK	Retrospective	2000 and 2008	Arthroscopic	32	32	59.5 (41 to 77)	58.9 (39 to 76)	21	21	11	11	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	(127.5, 70 - 140)	(123.8, 75 -135)	12 Months	
5	Cruz et al., 2023[17]	Spain	Retrospective	January 2010 and December 2015	Arthroscopic	24	56	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR			NR	NR
6	Dhar et al., 2013[22]	USA	Retrospective	2005 and 2009	Arthroscopic	56	67	65	61	29	38	27	29	6	7	34	23	31	46	25	21	34	48	115.3 (20-155)	124.1 (30-155)	12 Months	
7	Huang et al., 2016[23]	Taiwan	Retrospective	January 1, 2004, and December 31, 2007	Arthroscopic	58,652	117304	NR	NR	28,785	57570	29,867	59734	NR	NR	32,183	37932	NR	NR	NR	NR	NR	NR			1.56 (95% CI 1.25–1.93	
8	Khan et al., 2024[3]	USA	Retrospective	January 2014 to December 2018	Arthroscopic	289	113	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR			NR	NR
9	Miyatake et al., 2018[24]	Japan	Retrospective	January 2012 to December 2015	Arthroscopic	30	126	65.7 ± 6.0	64.1 ± 8.8	24	84	6	42	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	78.3 (50)	105.7 (46.4)	18.3 ± 9.4	19.2 ± 6.2
10	Quan et al., 2023[5]	USA	Retrospective	2006 to 2018	Open	6256	1422	62.46 (9.82) and 61.08 (9.72)	59.09 (11.11)	740	3569	682	2687	249	1188	2878	1172	NR	NR	NR	NR	NR	NR			NR	NR
11	Sayegh et al., 2022[25]	USA	Prospective	July 2012 to January 2021	Arthroscopic	32	652	NR	NR	18	376	14	269	1	30	NR	NR	NR	NR	NR	NR	NR	NR			NR	NR
12	Smith et al., 2021[26]	USA	Retrospective	2008 to 2017	Arthroscopic	41,157	188,829	56.3 (6.2)	53.5 (7.9)	23,492	109,126	17,665	79,703	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR			NR	NR
13	Takahashi et al., 2020[27]	Japan	Retrospective	April 2015 to May 2018	Arthroscopic	27	168	62.8 (46, 86)	61.1 (35e82)	15	96	12	72	NR	NR	NR	NR	20	121	7	47	NR	NR	123.5 ± 35.6	129.0 ± 44.1	NR	NR
14	Yeom et al., 2023[28]	Korea	Prospective	January 1, 2017, and December 31, 2019	Arthroscopic	35	148	62.4 ± 8.28	62.2 ± 7.7	21	80	14	68	6	17	NR	NR	24	107	11	41	26	106			21.45 ± 9.66	21.55 ± 9.99
Abbreviations; SD=Standard deviation, NR=Non-reported																											

Table 2: The results of meta-analysis and heterogeneity across the studies

Outcomes	Effect size	P-value of the effect size	Higgins I^2 statistic	Cochrane Q (*Chi*² test)
Infection	0.70 [0.20, 2.49]	0.58	95%	<0.001
Retear	1.62 [1.27, 2.06]	<0.001	26%	0.24
Reoperation	0.68 [0.31, 1.48]	0.33	94%	<0.001
Readmission	0.38 [0.01, 9.72]	0.56	99%	<0.001
Extended Hospital stays	1.02 [0.01, 170.64]	0.99	99%	<0.001
Complete Healing	2.68 [1.45, 4.95]	0.002	22%	0.26
VAS Pain	0.54 [0.29, 0.78]	<0.001	50%	0.13
Forward Flexion	-3.30 [-6.39, -0.21]	0.04	76%	0.002
Forward Extension	-4.46 [-9.42, 0.50]	0.08	91%	<0.001
Abduction	-0.07 [-3.59, 3.45]	0.97	74%	0.01
Functional Score	-1.06 [-2.39, 0.27]	0.12	99%	<0.001
Constant Score	-0.43 [-4.24, 3.39]	0.83	68%	0.08

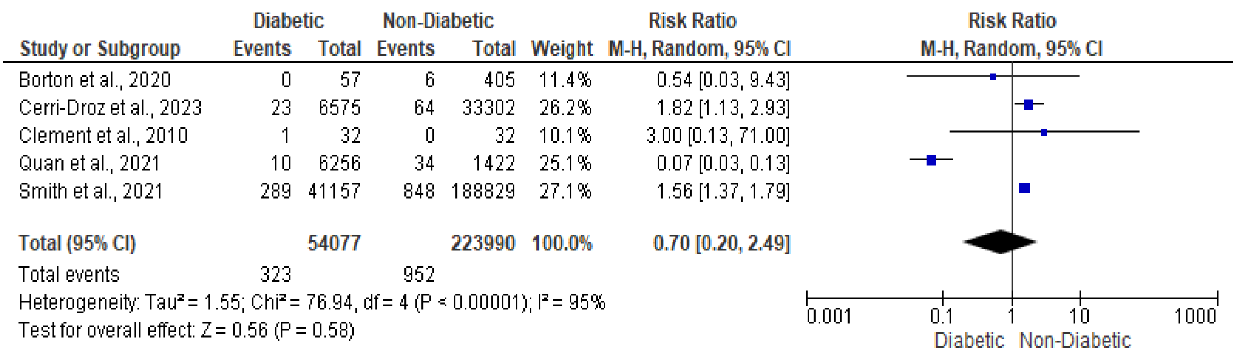

Figure 2: Forest plot of summary analysis of the risk ratio (RR) and 95% CI of the risk of infection among the diabetic and non-diabetic groups. The size of the blue squares is proportional to the statistical weight of each trial. The grey diamond represents the pooled point estimate. The positioning of both diamonds and squares (along with 95% CIs) beyond the vertical line (unit value) suggests a significant outcome (IV = inverse variance).

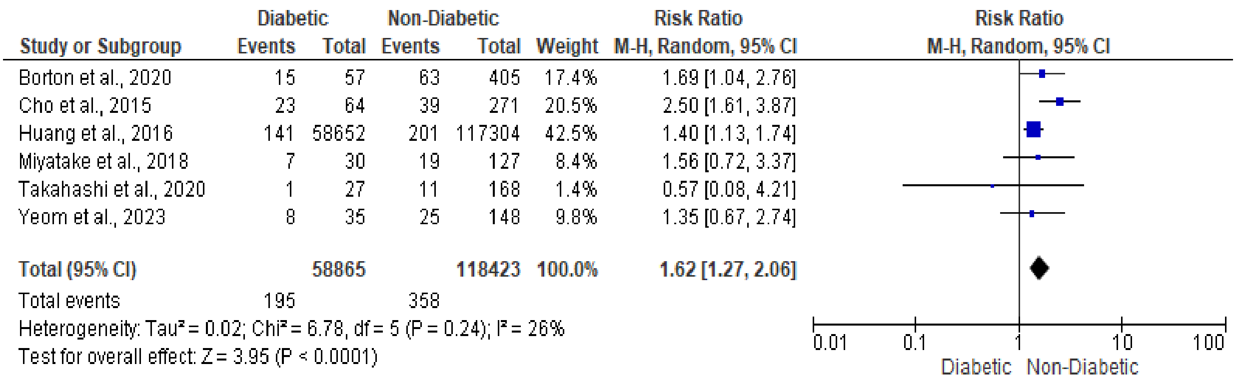

Figure 3: Forest plot of summary analysis of the risk ratio (RR) and 95% CI of the risk of re-tear among the diabetic and non-diabetic groups. The size of the blue squares is proportional to the statistical weight of each trial. The grey diamond represents the pooled point estimate. The positioning of both diamonds and squares (along with 95% CIs) beyond the vertical line (unit value) suggests a significant outcome (IV = inverse variance).

Re-Tear

Six articles included 177288 patients evaluated the risk of re-tear among the diabetic and non-diabetic patients.[18,20,23,24,27,28] Pooling the data revealed that diabetic patients were 1.62 times at higher risk of retar, relative to non-diabetic patients (RR 1.62; 95% 1.27, 2.06; P<0.001) in the random-effects model (I^2=26%, P=0.24). (Figure 3)

Reoperation

The risk of reoperation was assessed among 278485 patients within six articles.[3,5,17-19,26] In the random-effects model (I^2=94%, P<0.001), there was no statistically significant difference between the diabetic and the non-diabetic patients regarding the risk of reoperation (RR 0.68; 95% 0.31, 1.48; P=0.33). (Figure 4)

Readmission

Two studies included 47,555 patients evaluated the risk of readmission between the diabetic and the non-diabetic patients.[5,19] There was no statistically significant difference between both groups with a risk ratio of 0.38 (95%CI; 0.01, 9.72; P=0.56) in the random-effects model (I^2=99%, P<0.001). (Figure 5)

Functional Outcomes

Extended hospital stays

Two studies included 47,555 patients evaluated the difference between the diabetic and the non-diabetic groups regarding the prolonged hospital stays.[5,19] There was a similar risk of prolonged hospital stays between the diabetic and the non-diabetic groups with a RR of 1.02 (95%CI; 0.01, 170.64; P=0.99) in the random-effects model (I^2=100%, P<0.001). (Figure 6)

Complete Healing

Two articles included 491 patients evaluated the potentiality for complete healing among the diabetic and the non-diabetic groups.[20,24] Non-diabetic patients were at

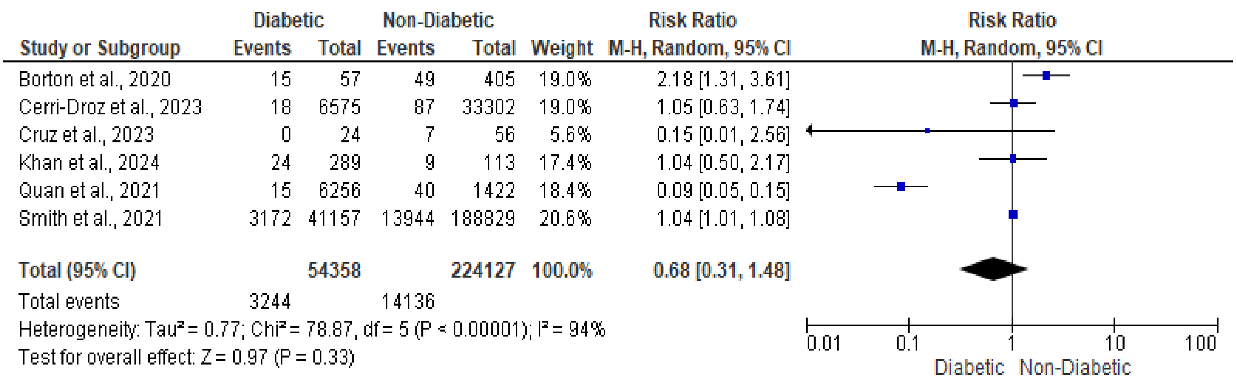

Figure 4: Forest plot of summary analysis of the risk ratio (RR) and 95% CI of the risk of reoperation among the diabetic and non-diabetic groups. The size of the blue squares is proportional to the statistical weight of each trial. The grey diamond represents the pooled point estimate. The positioning of both diamonds and squares (along with 95% CIs) beyond the vertical line (unit value) suggests a significant outcome (IV = inverse variance).

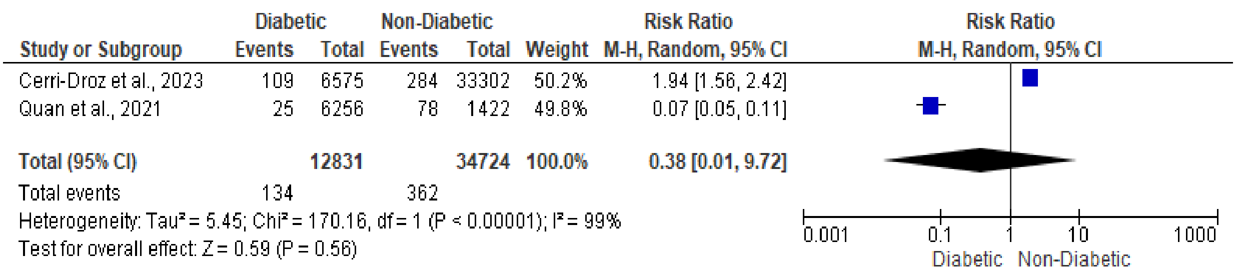

Figure 5: Forest plot of summary analysis of the risk ratio (RR) and 95% CI of the risk of readmission among the diabetic and non-diabetic groups. The size of the blue squares is proportional to the statistical weight of each trial. The grey diamond represents the pooled point estimate. The positioning of both diamonds and squares (along with 95% CIs) beyond the vertical line (unit value) suggests a significant outcome (IV = inverse variance).

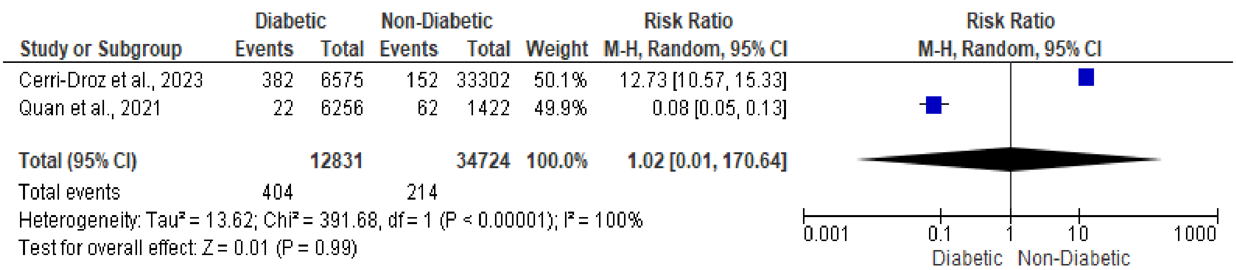

Figure 6: Forest plot of summary analysis of the risk ratio (RR) and 95% CI of the risk of prolonged hospital stays among the diabetic and non-diabetic groups. The size of the blue squares is proportional to the statistical weight of each trial. The grey diamond represents the pooled point estimate. The positioning of both diamonds and squares (along with 95% CIs) beyond the vertical line (unit value) suggests a significant outcome (IV = inverse variance).

higher chance to achieve complete healing with an OR of 2.68 (95%CI; 1.45, 4.95; P=0.002) in the random-effects model (I^2=22%, P=0.26). (Figure 7)

VAS Pain

The difference between the diabetic and non-diabetic patients regarding post-operative pain was evaluated within three studies including 1202 patients.[20,25,28] There was a statistically significant higher mean VAS pain levels among the diabetic patients (MD 0.54; 95% 0.29, 0.78; P<0.001) in the random-effects model (I^2=50%, P=0.13). (Figure 8)

Forward flexion

Five articles included 873 patients evaluated the difference between the diabetic and the non-diabetic groups regarding the forward flexion degree.[20-22,24,27] There was a statistically significant higher mean forward flexion degree among the nondiabetic group with a MD of -3.30 (95% -6.39, -0.21; P=0.04) in the random-effects model (I^2=76%, P=0.002). (Figure 9)

Extension

The difference between the diabetic and the non-diabetic groups regarding the extension degree was

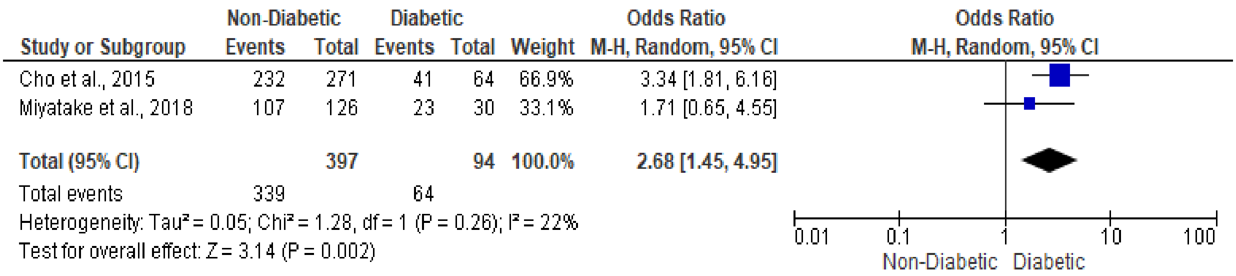

Figure 7: Forest plot of summary analysis of the odds ratio (OR) and 95% CI of the chance of complete healing among the diabetic and non-diabetic groups. The size of the blue squares is proportional to the statistical weight of each trial. The grey diamond represents the pooled point estimate. The positioning of both diamonds and squares (along with 95% CIs) beyond the vertical line (unit value) suggests a significant outcome (IV = inverse variance).

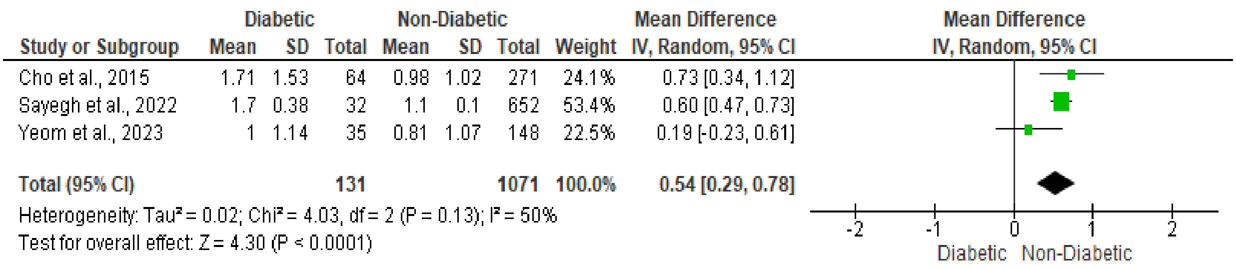

Figure 8: Forest plot of summary analysis of the mean difference (MD) and 95% CI of the mean VAS pain levels among the diabetic and non-diabetic groups. The size of the blue squares is proportional to the statistical weight of each trial. The grey diamond represents the pooled point estimate. The positioning of both diamonds and squares (along with 95% CIs) beyond the vertical line (unit value) suggests a significant outcome (IV = inverse variance).

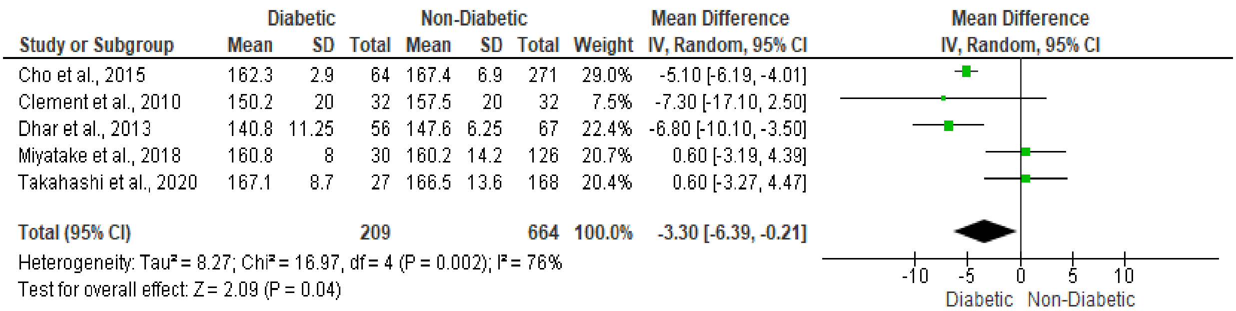

Figure 9: Forest plot of summary analysis of the mean difference (MD) and 95% CI of the mean forward flexion degree among the diabetic and non-diabetic groups. The size of the blue squares is proportional to the statistical weight of each trial. The grey diamond represents the pooled point estimate. The positioning of both diamonds and squares (along with 95% CIs) beyond the vertical line (unit value) suggests a significant outcome (IV = inverse variance).

evaluated within five articles included 873 patients.[20-22,24,27] There was no statistically significant difference between both groups (MD -4.46; 95% -9.42, 0.50; P=0.08) in the random-effects model (I^2=91%, P<0.001). (Figure 10)

Abduction

Four articles included 678 patients evaluated the difference between the diabetic and the non-diabetic groups regarding the abduction degree.[20-22,24] In the random-effects model (I^2=74%, P=0.01), there was no statistically significant difference between both groups (MD -0.07; 95% -3.59, 3.45; P=0.97). (Figure 11)

Function Score

The difference between the diabetic and the non-diabetic groups regarding the mean functional score was reported in six articles including 1,676 patients.[19,22,24,25,27,28] There was no statistically significant difference between both groups with a SMD of -1.06 (95% -2.39, 0.27; P=0.12) in the random-effects model (I^2=99%, P<0.001). (Figure 12)

Constant Score

Two studies included 530 patients evaluated the difference between diabetic and non-diabetic groups

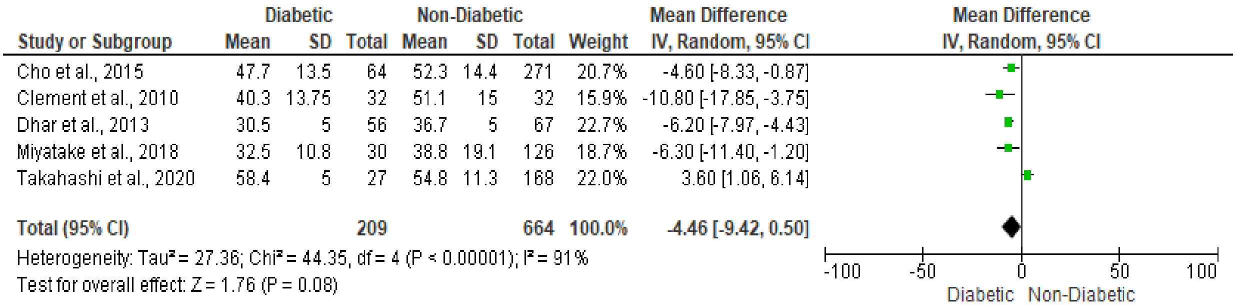

Figure 10: Forest plot of summary analysis of the mean difference (MD) and 95% CI of the mean extension degree among the diabetic and non-diabetic groups. The size of the blue squares is proportional to the statistical weight of each trial. The grey diamond represents the pooled point estimate. The positioning of both diamonds and squares (along with 95% CIs) beyond the vertical line (unit value) suggests a significant outcome (IV = inverse variance).

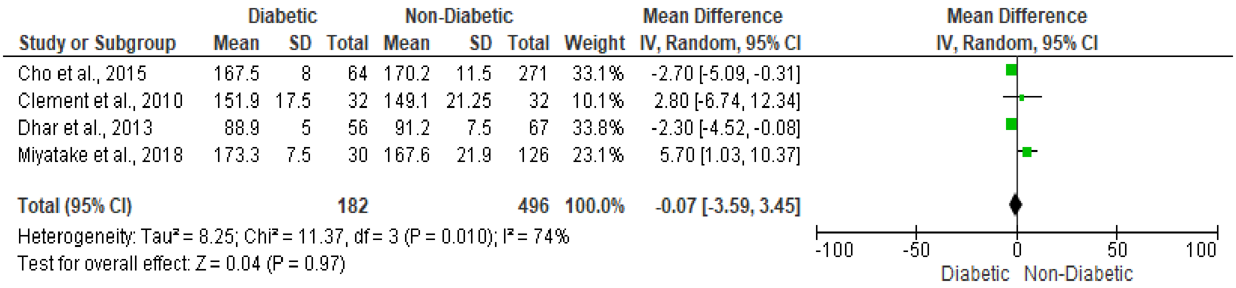

Figure 11: Forest plot of summary analysis of the mean difference (MD) and 95% CI of the mean abduction degree among the diabetic and non-diabetic groups. The size of the blue squares is proportional to the statistical weight of each trial. The grey diamond represents the pooled point estimate. The positioning of both diamonds and squares (along with 95% CIs) beyond the vertical line (unit value) suggests a significant outcome (IV = inverse variance).

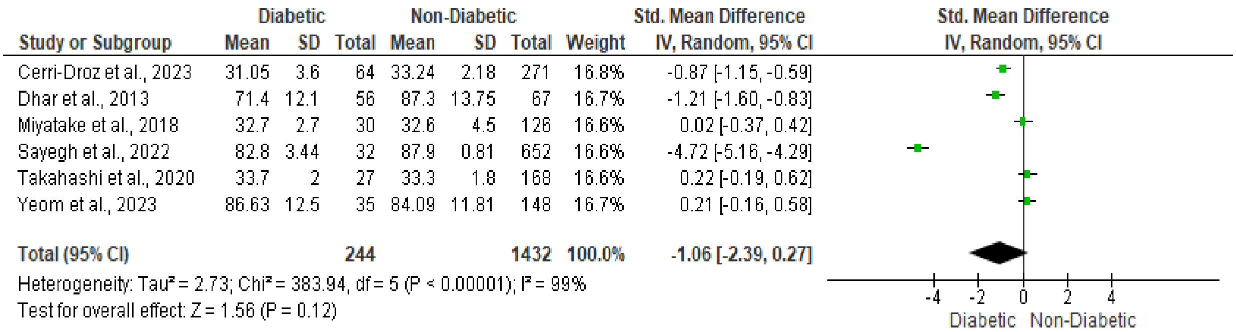

Figure 12: Forest plot of summary analysis of the standardized mean difference (SMD) and 95% CI of the mean function score among the diabetic and non-diabetic groups. The size of the blue squares is proportional to the statistical weight of each trial. The grey diamond represents the pooled point estimate. The positioning of both diamonds and squares (along with 95% CIs) beyond the vertical line (unit value) suggests a significant outcome (IV = inverse variance).

regarding the constant score.[20,27] There was no statistically significant difference (P=0.83) between both groups (MD -0.43; 95% -4.24, 3.39) in the random-effects model (I^2=68%, P=0.08). (Figure 13)

Preoperative HbA1c Levels for Predicting Retear

Two articles reported the diagnostic accuracy of preoperative HbA1c and the risk of retear/reoperation.[3,28] Pooling the data revealed sensitivity of 0.44 (95%CI; 0.29 to 0.60) and pooled specificity of 0.70 (95%CI; 0.66 to 0.74). The PLR was 1.46 (95%CI; 1.02 to 2.10) and NLR of 0.81 (95%CI; 0.61 to 1.06). (Figure 14)

Discussion

The meta-analysis findings highlighting the significant association between elevated preoperative HbA1c levels and increased risk of surgical revision and retear are particularly impactful. HbA1c is considered a reliable

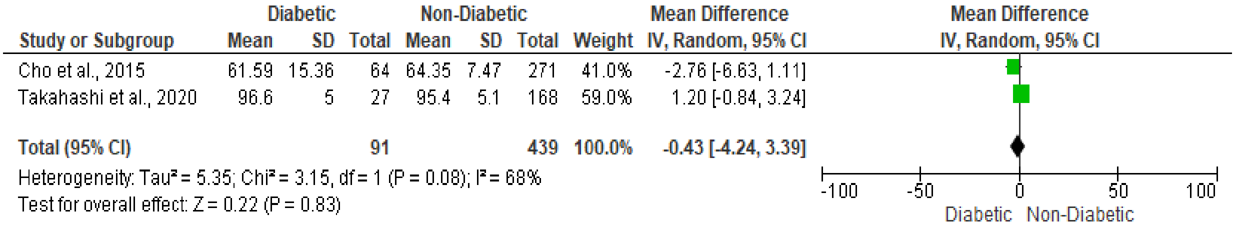

Figure 13: Forest plot of summary analysis of the mean difference (MD) and 95% CI of the mean constant score among the diabetic and non-diabetic groups. The size of the blue squares is proportional to the statistical weight of each trial. The grey diamond represents the pooled point estimate. The positioning of both diamonds and squares (along with 95% CIs) beyond the vertical line (unit value) suggests a significant outcome (IV = inverse variance).

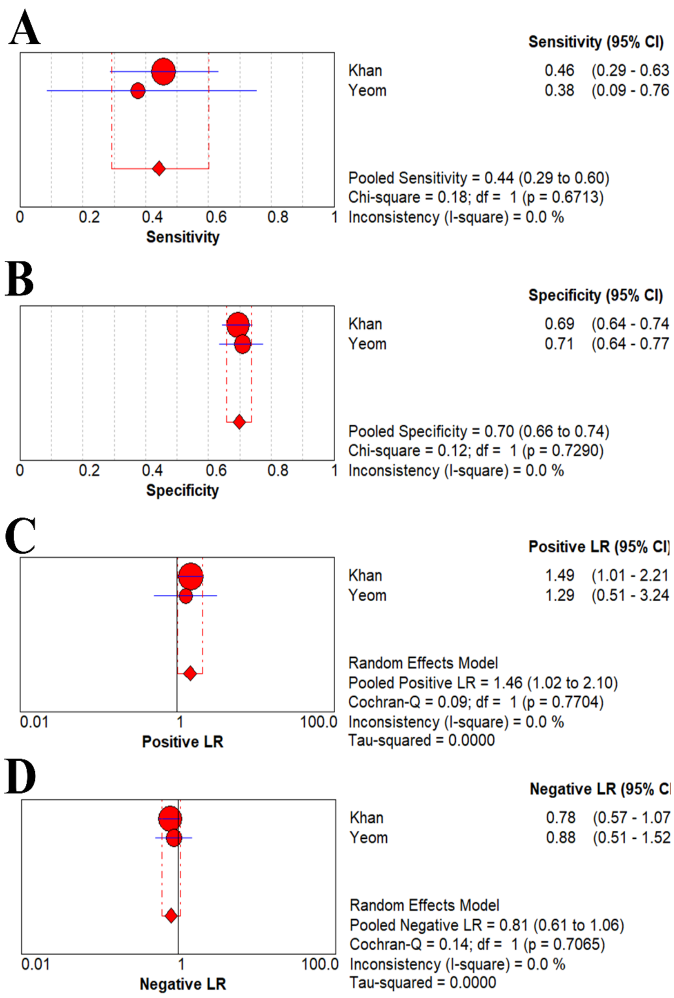

Figure 14: Forest plot of summary analysis of the pooled (A) Sensitivity, (B) Specificity, (C) Positive predictive value and (D) Negative predictive value

marker of long-term glycemic control, and its elevation is indicative of suboptimal management of diabetes. This aligns with previous research demonstrating the detrimental effects of poor glycemic control on musculoskeletal healing and surgical outcomes.[7,29,30] These results were consistent with Lu et al., 2021 review who reported a higher rate of shoulder retear and cuff unhealing among diabetic patients yet with comparable clinical and functional outcomes with non-diabetic patients.[7] Arora et al., 2020 reported a considerable complication rate after rotator cuff repair among diabetic patients. Diabetes weakens the architecture of the cuff muscles, minimizing the load to failure and reduce the tendon healing capability.[8]

One key mechanism by which diabetes impairs tendon and soft tissue healing is through the disruption of collagen synthesis and cross-linking. Hyperglycemia can interfere with the normal collagen production process, compromising the structural integrity of the rotator cuff tendons. This may predispose diabetic patients to a higher risk of tendon re-tearing or failed healing following surgical repair.[17,21]

In addition, diabetes-related microvascular dysfunction and impaired angiogenesis can limit the delivery of oxygen and nutrients to the surgical site, thereby hindering the overall healing cascade. This vascular compromise, combined with the dysregulation of the inflammatory response seen in diabetes, may contribute to the increased susceptibility to surgical complications observed in this patient population. Interestingly, the meta-analysis did not find significant differences between diabetic and non-diabetic patients in other outcomes, such as functional scores, infection risk, and hospital utilization.[19,31] This suggests that the impact of diabetes on rotator cuff repair outcomes may be more pronounced in specific measures of structural integrity and biomechanical function, rather than broad functional or patient-reported measures.

This finding underscores the importance of utilizing a comprehensive assessment of outcomes when evaluating the effects of diabetes on surgical results. While functional scores and patient-reported measures are valuable, they may not fully capture the nuanced impacts of glycemic control on the structural and biomechanical aspects of rotator cuff healing. The clinical implications of these findings are significant.[3,32] Surgeons should thoroughly evaluate a patient's glycemic control status when discussing the risks and benefits of rotator cuff repair. Strategies to optimize perioperative glycemic management, such as intensive insulin therapy, dietary modifications, and patient education, may be warranted to mitigate the negative effects of diabetes on surgical outcomes. Moreover, shared decision-making between patients and providers regarding the appropriateness of rotator cuff repair in the setting of suboptimal glycemic control should be a priority. Patients should be fully informed of the potential risks associated with poor glycemic control, and collaborative discussions should explore alternative treatment options or the feasibility of delaying surgery until better glycemic control is achieved.

Conclusion

This research had shown that diabetic patients have a higher risk of requiring additional surgical revisions and experiencing a retear of the repaired rotator cuff tendon. Non-diabetic patients generally achieve better outcomes in terms of complete healing of the rotator cuff, as well as improvements in pain and range of motion. However, diabetes does not appear to significantly impact other outcomes like functional scores, infection risk, and hospital utilization. These findings suggest that optimizing a diabetic patient's glycemic control may be important in improving their outcomes following the surgery. This opens a new area for research to be done on rotator cuff tear repair surgery to fully understand the specific mechanisms driving the differences in outcomes between diabetic and non-diabetic patients. This could help develop more strategies to minimize the negative impact of diabetes on rotator cuff injuries and repair procedures.

Conflict of Interest

All authors have no conflict of interest to disclose, review, and agree to the content of the manuscript content.

Ethical approval

Since the research involved a systematic review of published data, an IRB is not required.

Authors Contributions

All authors - AA, FA, NA, and WA - have made substantial contributions to the conception, design of the work, FA was involved in the acquisition, analysis, while NA did the interpretation of data for the work. Additionally, AA has been involved in drafting the work, WA was revising it critically for important intellectual content. Furthermore, they all had provided final approval of the version to be published and have agreed to be accountable for all aspects of the work, ensuring that any questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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