THE PROGNOSTIC ROLE OF RED CELL DISTRIBUTION WIDTH IN PREDICTING MORTALITY AND SEVERITY AMONG ACUTE PANCREATITIS (AP)

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COI Disclosure

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The authors have no conflicts of interest to disclose.

BACKGROUND

- Acute pancreatitis (AP), one of the most common diseases of the gastrointestinal tract, is a rapidly developed inflammatory process of the pancreas that varies in terms of clinical presentation and severity death[1].
- Red cell distribution width (RDW) is a routine parameter of the complete blood count (CBC) test, described as simple, easy, inexpensive and quantitative that measures size variability of erythrocytes[2]
- Previous studies demonstrates that RDW is likely a useful predictive parameter of AP severity and mortality[3].
- However, existing evidences are inconsistent regarding to its ability of predicting the prognosis of patients with AP.

[1]Tenner S, Baillie J, et, al. Am J Gastroenterol 2013;108:1400–15. 1416.
[2]Patel KV et al. J Gerontol A Biol Sci Med Sci 2009;65:258-65.
[3]Zhang T, et al. Shock 2018;49:551–5

OBJECTIVE

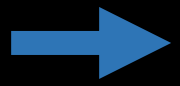
We aimed to evaluate the role of RDW in predicting mortality and severity among AP

METHOD

A comprehensive search was conducted to identify all eligible studies → assessed the association of RDW and in acute pancreatitis published until January 2020

Databases :

- **Pubmed**
- **Google Scholar**
- **Proquest**
- **Science Direct**
- **Clinical Key**
- **Cochrane**



Revman 5.3, Random Effect or Fix Effect based on heterogeneity test for relative risk (RR) with Confidence Intervals (95% CI)

METHOD

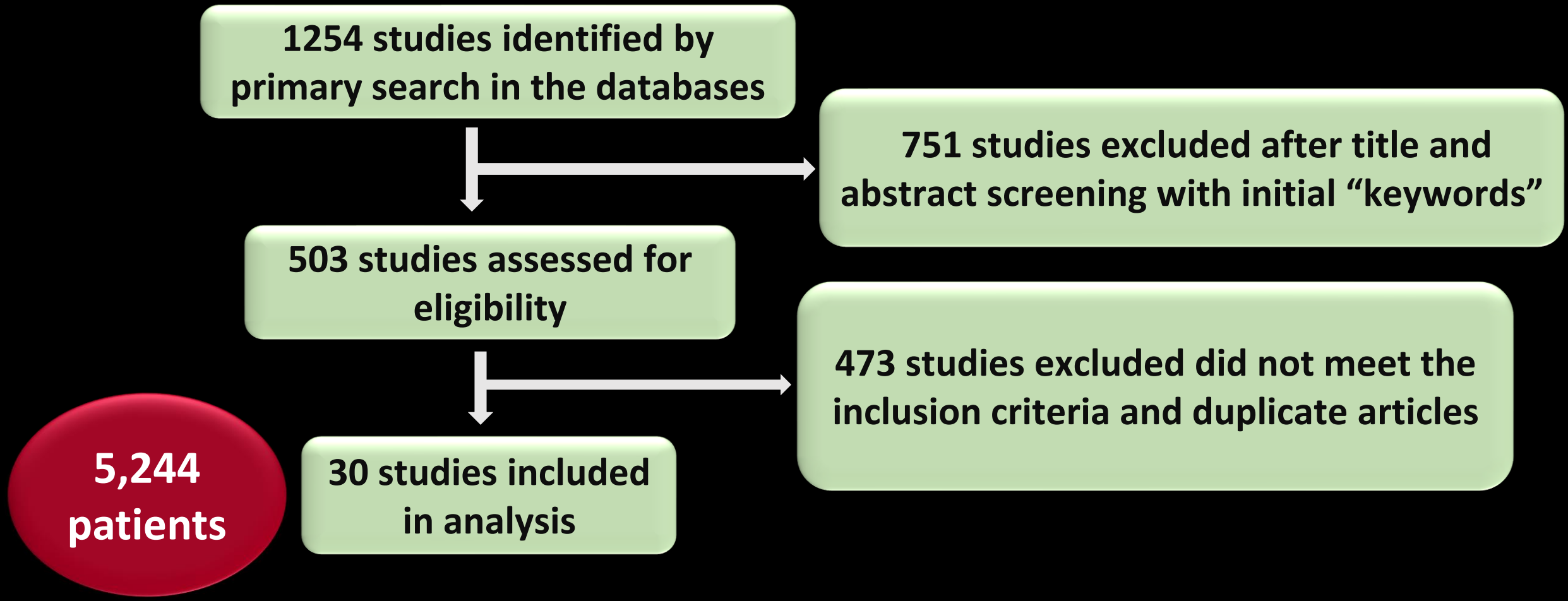
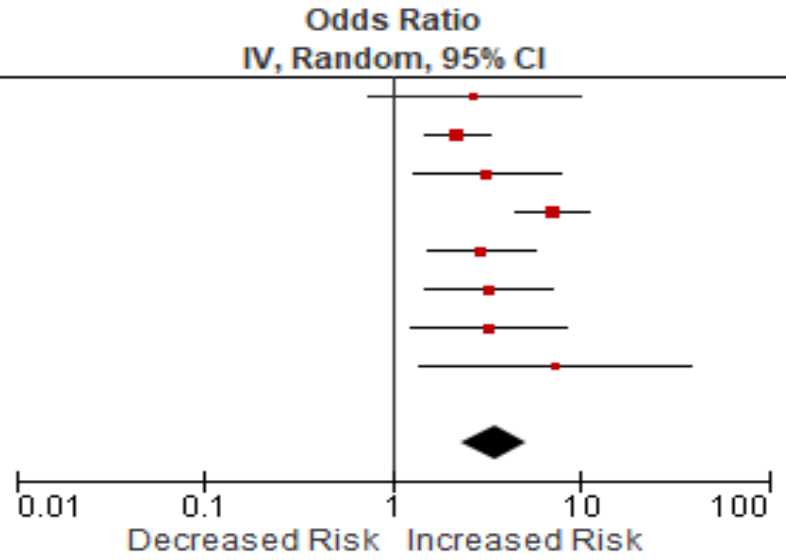


Figure 1. Flow diagram of studies selection

RESULT

Study or Subgroup	log[Odds Ratio]	SE	Weight	Odds Ratio IV, Random, 95% CI
Hasan 2018	0.9933	0.6624	6.8%	2.70 [0.74, 9.89]
Huang Xin 2018	0.7966	0.1969	20.2%	2.22 [1.51, 3.26]
Li 2017	1.1439	0.4588	11.0%	3.14 [1.28, 7.71]
O'Connell 2018	1.9523	0.2233	19.2%	7.04 [4.55, 10.91]
Zhang W 2017	1.0869	0.3347	14.9%	2.97 [1.54, 5.71]
Zhang XS 2019	1.1888	0.3987	12.8%	3.28 [1.50, 7.17]
Zheng D 2018	1.186	0.4826	10.4%	3.27 [1.27, 8.43]
Zhou 2019	1.9962	0.8511	4.7%	7.36 [1.39, 39.03]
Total (95% CI)			**100.0%**	**3.52 [2.37, 5.25]**

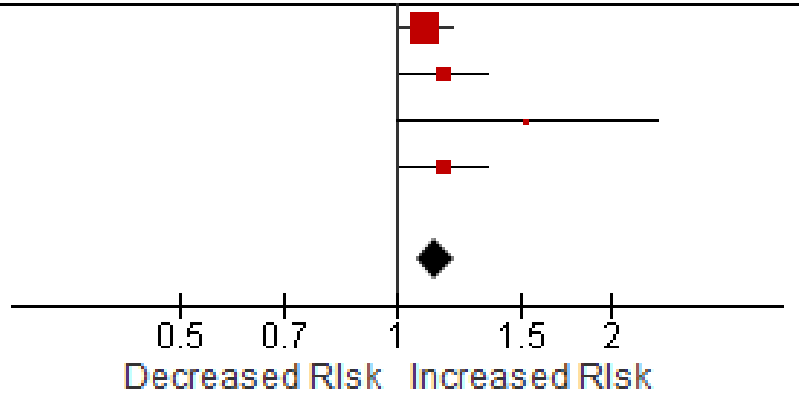
Heterogeneity: Tau² = 0.17; Chi² = 16.44, df = 7 (P = 0.02); I² = 57%
Test for overall effect: Z = 6.19 (P < 0.00001)



Higher RDW was indicated as independent predictors for mortality compared to lower RDW (OR = 3.5)

Study or Subgroup	log[Odds Ratio]	SE	Weight	Odds Ratio IV, Fixed, 95% CI
Bedel 2019	0.0953	0.044	55.1%	1.10 [1.01, 1.20]
Chen Nan 2015	0.157	0.0708	21.3%	1.17 [1.02, 1.34]
Hu 2016	0.4226	0.2133	2.3%	1.53 [1.00, 2.32]
Juan Yang 2016	0.157	0.0708	21.3%	1.17 [1.02, 1.34]
Total (95% CI)			**100.0%**	**1.14 [1.07, 1.21]**

Heterogeneity: Chi² = 2.79, df = 3 (P = 0.42); I² = 0%
Test for overall effect: Z = 3.96 (P < 0.0001)



Every increased RDW value of 1%, the risk of mortality was also significantly increased by 14%

Figure 2. Pooled estimation of NLR in prediction of mortality among AP patients

RESULT

Study or Subgroup	log[Odds Ratio]	SE	Weight	Odds Ratio IV, Fixed, 95% CI
Cao 2018	0.8796	0.279	17.5%	2.41 [1.39, 4.16]
Li 2017	0.9294	0.3154	13.7%	2.53 [1.37, 4.70]
Peng 2017	0.8154	0.2238	27.2%	2.26 [1.46, 3.50]
Wang Zen 2016	0.9377	0.3777	9.5%	2.55 [1.22, 5.35]
Zhou 2019	0.5533	0.2057	32.2%	1.74 [1.16, 2.60]
Total (95% CI)			**100.0%**	**2.16 [1.72, 2.71]**

Heterogeneity: Chi² = 1.76, df = 4 (P = 0.78); I² = 0%
Test for overall effect: Z = 6.60 (P < 0.00001)

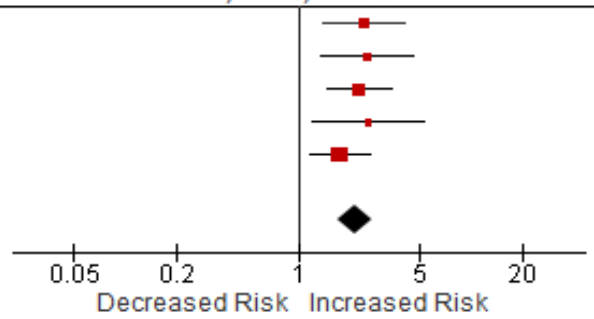


Figure 3. Pooled estimation of RDW in prediction of severe AP among AP patients

Study or Subgroup	Death Mean	Death SD	Death Total	Survive Mean	Survive SD	Survive Total	Weight	Mean Difference IV, Random, 95% CI
Bedel 2019	18.8	4.7	11	14.8	1.8	159	1.9%	4.00 [1.21, 6.79]
Cetinkaya 2014	15.6	5.185185	13	13.3	1.333333	89	1.8%	2.30 [-0.53, 5.13]
Hasan 2018	15.03	1.3	14	12.5	1.4	115	8.4%	2.53 [1.80, 3.26]
Hu 2016	15.1	1.8	17	14.2	1.3	134	7.5%	0.90 [0.02, 1.78]
Li 2017	25	11.25	31	10.47	9.78	328	1.0%	14.53 [10.43, 18.63]
Luan X 2017	15.7	5.703704	13	13.3	1.333333	151	1.6%	2.40 [-0.71, 5.51]
Moharamzadeh 2018	16.44	4.22	5	13.68	1.37	95	1.1%	2.76 [-0.95, 6.47]
Orak 2016	17.18	2.07	16	16.37	1.73	478	6.7%	0.81 [-0.22, 1.84]
Rezan 2019	15.25	0.925926	16	13.9	1.277778	327	9.8%	1.35 [0.88, 1.82]
Senol 2013	15.6	5.185185	13	13.3	1.333333	89	1.8%	2.30 [-0.53, 5.13]
Soares 2018	15.3	1.4	16	13.5	1.3	166	8.4%	1.80 [1.09, 2.51]
Wang D 2015	14.13	0.85	16	12.82	0.95	114	9.9%	1.31 [0.86, 1.76]
Yang Li 2016	18.43	3.95	11	15.49	1.94	38	2.4%	2.94 [0.53, 5.35]
Yao 2014	14.2	0.72	8	12.98	1.04	98	9.4%	1.22 [0.68, 1.76]
Zhang W 2017	15.34	0.97	18	13.35	0.97	148	9.8%	1.99 [1.52, 2.46]
Zhang XS 2019	15.09	1.63	20	13.59	0.88	22	7.9%	1.50 [0.70, 2.30]
Zhou 2019	14.24	0.49	13	13	0.666667	392	10.7%	1.24 [0.97, 1.51]
Total (95% CI)			**251**			**2943**	**100.0%**	**1.74 [1.33, 2.16]**

Heterogeneity: Tau² = 0.41; Chi² = 66.07, df = 16 (P < 0.00001); I² = 76%
Test for overall effect: Z = 8.18 (P < 0.00001)

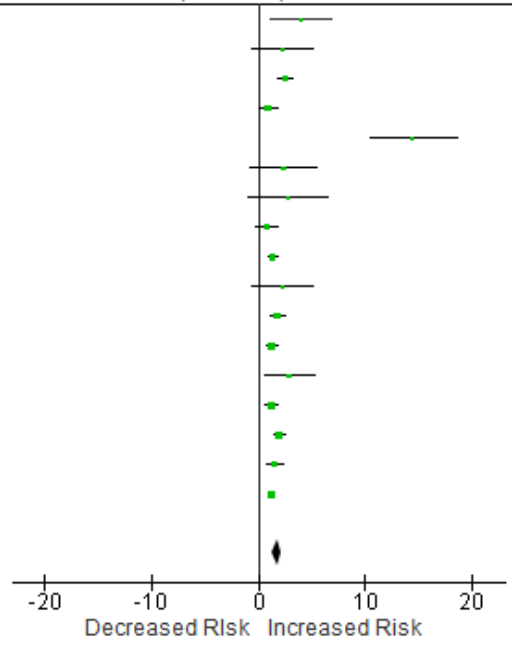


Figure 4. Pooled estimation of weighted mean difference of RDW between mortality and survived patients with acute pancreatitis.

RESULT

Study or Subgroup	Severe Mean	Severe SD	Severe Total	Mild Mean	Mild SD	Mild Total	Weight	Mean Difference IV, Random, 95% CI
Cao 2018	13.6	0.41	14	12.9	0.66	97	7.6%	0.70 [0.45, 0.95]
Kilic 2017	14.25	1.407407	40	13.6	1.259259	162	7.1%	0.65 [0.17, 1.13]
Li 2017	19.65	8.35	86	8.46	8.945	197	2.8%	11.19 [9.03, 13.35]
Lyu Y 2015	19.2	2.4	28	14.9	1.9	35	5.3%	4.30 [3.21, 5.39]
Moharamzadeh 2018	15.61	3.13	10	13.62	1.34	90	3.1%	1.99 [0.03, 3.95]
Orak 2016	16.55	1.86	194	16.3	1.67	300	7.4%	0.25 [-0.07, 0.57]
Peng 2017	13.75	0.874074	30	13	0.740741	128	7.4%	0.75 [0.41, 1.09]
Ragvagan 2019	15.5	1.62963	8	13.4	0.666667	22	5.1%	2.10 [0.94, 3.26]
Rezan 2019	15.05	1.518519	64	13.8	1.111111	279	7.3%	1.25 [0.86, 1.64]
Soares 2018	14.6	1.3	91	12.7	0.5	91	7.5%	1.90 [1.61, 2.19]
Wang 2017	14.6	0.9	10	14	1.4	100	6.7%	0.60 [-0.02, 1.22]
Yalcin 2016	17.3	2.3	36	14.5	2.1	144	6.1%	2.80 [1.97, 3.63]
Yang Li 2016	17.52	4.91	49	14.17	2.31	49	4.1%	3.35 [1.83, 4.87]
Yao 2014	14.4	1.06	26	12.6	0.59	80	7.2%	1.80 [1.37, 2.23]
Zhang 2017	14.03	1.74	104	13.23	1.23	441	7.4%	0.80 [0.45, 1.15]
Zhou 2019	13.66	0.74	56	12.9	0.666667	237	7.6%	0.76 [0.55, 0.97]
Total (95% CI)			**846**			**2452**	**100.0%**	**1.72 [1.27, 2.17]**

Heterogeneity: $Tau^2 = 0.68$; $Chi^2 = 243.20$, $df = 15$ ($P < 0.00001$); $I^2 = 94\%$

Test for overall effect: $Z = 7.47$ ($P < 0.00001$)

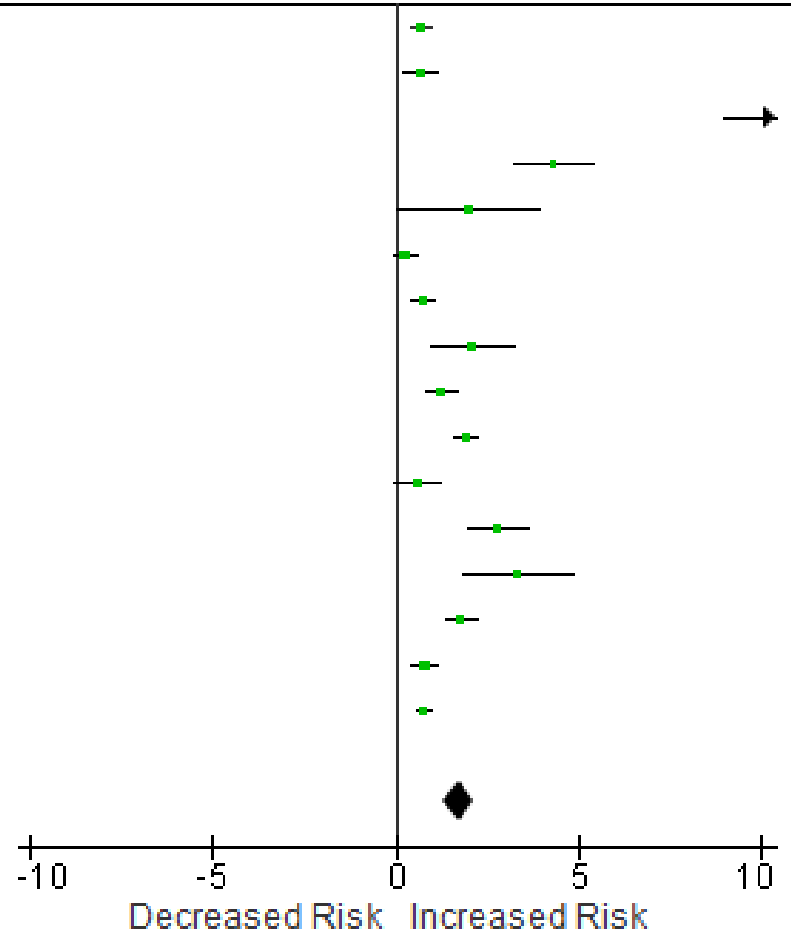


Figure 5. Pooled estimation of weighted mean difference of NLR between Severe Acute Pancretitis and Mild Acute Pancretitis .

CONCLUSION

Higher RDW value was associated with mortality and severity among AP patients. Therefore, the use of the potential role of RDW should be emphasized since inexpensive and simple to obtain, even in limited-resource settings.