Return to full duty after anterior cruciate ligament reconstruction surgery in military personnel: A meta-analysis.

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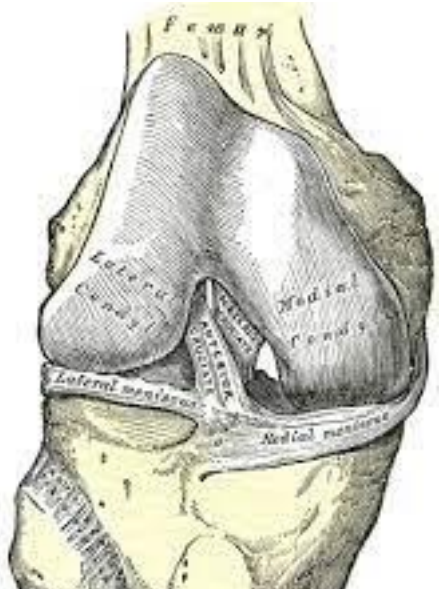

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Conflict of interest

- **None of the authors have any conflict of interest.**
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Objective

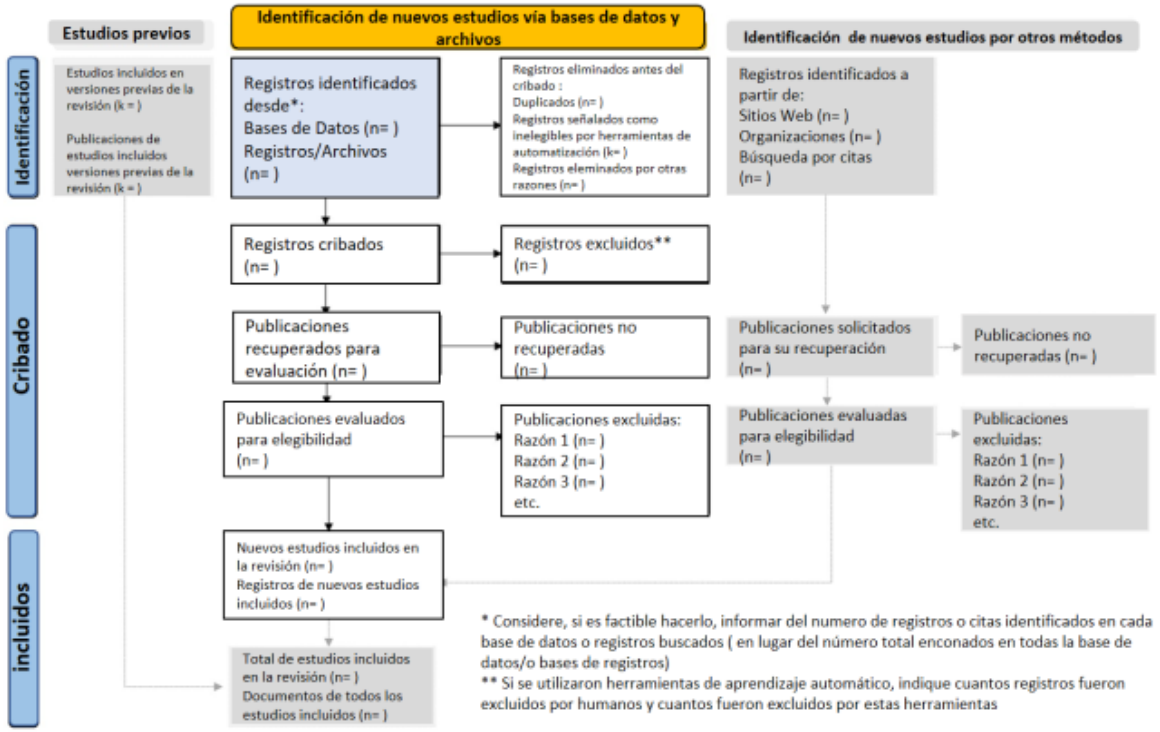
To conduct a systematic review and meta-analysis to evaluate clinical and functional outcomes regarding return to full military activity before ACL surgery according to military rank.

Material and method

ELIGIBILITY CRITERIA

A systematic literature review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

Inclusion criteria followed the PICO strategy: studies (prospective and retrospective) reported clinical and functional outcomes of primary ACL surgery in military personnel in at least one questionnaire.



Material and method

SEARCH STRATEGY

PubMed/MEDLINE, Google Scholar, and ScienceDirect.

Until December 2022.

Articles in English and Spanish.

No restrictions were applied based on year of publication or level of evidence.

The bibliographic references of the selected articles were also analyzed to identify other studies potentially included in the review.

Material and method

RISK ASSESSMENT

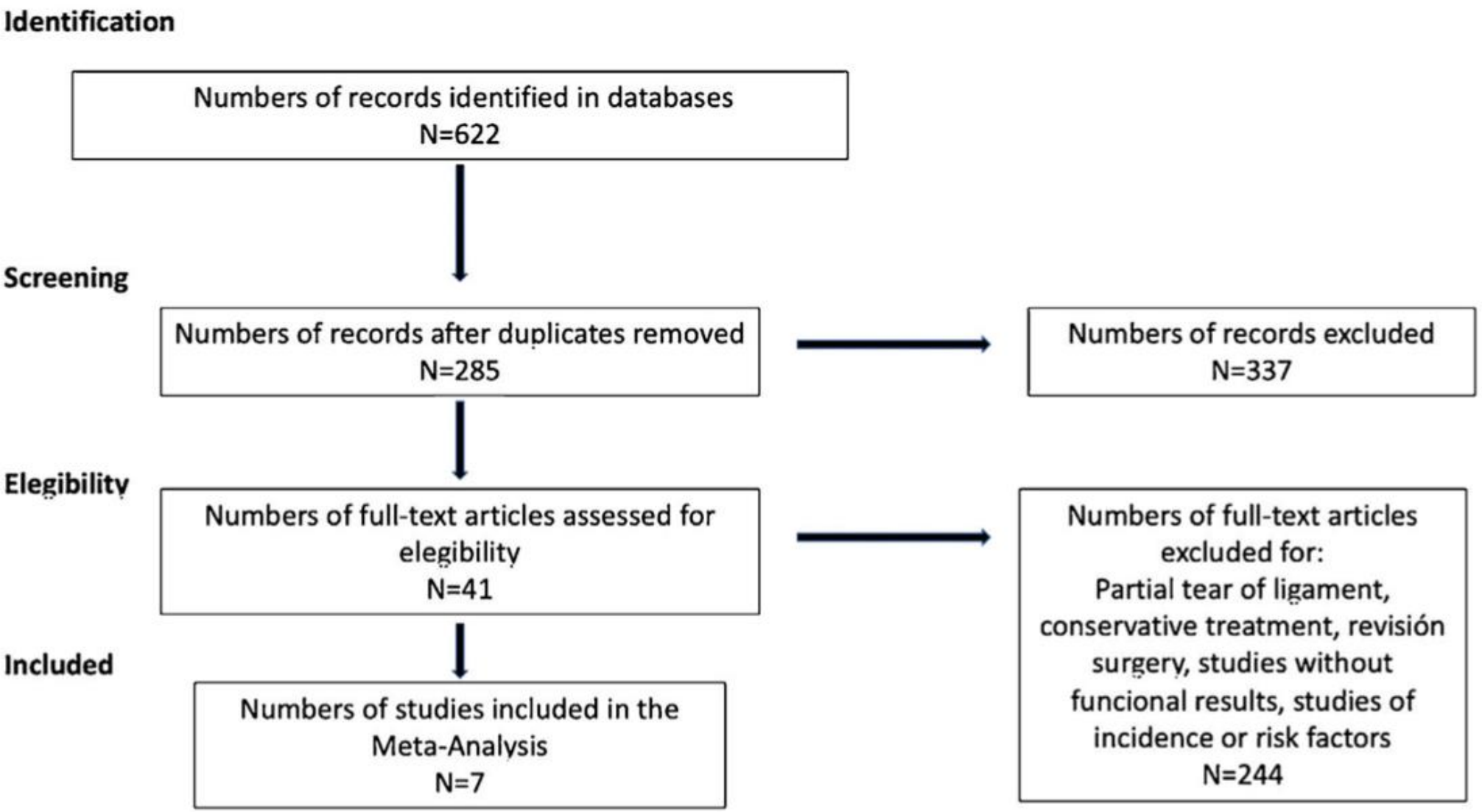
The assessment of the methodological quality of the included studies was based on the Methodological Index for Non-Randomized Studies (MINORS) criteria for risk of bias in retrospective studies.

It includes 8 items for non-comparative studies and 12 items for comparative studies.

Methodological items for non-randomized studies	Score†
1. **A clearly stated aim:** the question addressed should be precise and relevant in the light of available literature	
2. **Inclusion of consecutive patients**: all patients potentially fit for inclusion (satisfying the criteria for inclusion) have been included in the study during the study period (no exclusion or details about the reasons for exclusion)	
3. **Prospective collection of data**: data were collected according to a protocol established before the beginning of the study	
4. **Endpoints appropriate to the aim of the study**: unambiguous explanation of the criteria used to evaluate the main outcome which should be in accordance with the question addressed by the study. Also, the endpoints should be assessed on an intention-to-treat basis.	
5. **Unbiased assessment of the study endpoint**: blind evaluation of objective endpoints and double-blind evaluation of subjective endpoints. Otherwise the reasons for not blinding should be stated	
6. **Follow-up period appropriate to the aim of the study**: the follow-up should be sufficiently long to allow the assessment of the main endpoint and possible adverse events	
7. **Loss to follow up less than 5%**: all patients should be included in the follow up. Otherwise, the proportion lost to follow up should not exceed the proportion experiencing the major endpoint	
8. **Prospective calculation of the study size**: information of the size of detectable difference of interest with a calculation of 95% confidence interval, according to the expected incidence of the outcome event, and information about the level for statistical significance and estimates of power when comparing the outcomes	
Additional criteria in the case of comparative study	
9. **An adequate control group**: having a gold standard diagnostic test or therapeutic intervention recognized as the optimal intervention according to the available published data	
10. **Contemporary groups**: control and studied group should be managed during the same time period (no historical comparison)	
11. **Baseline equivalence of groups**: the groups should be similar regarding the criteria other than the studied endpoints. Absence of confounding factors that could bias the interpretation of the results	
12. **Adequate statistical analyses**: whether the statistics were in accordance with the type of study with calculation of confidence intervals or relative risk	

†The items are scored 0 (not reported), 1 (reported but inadequate) or 2 (reported and adequate). The global ideal score being 16 for non-comparative studies and 24 for comparative studies.

Search results



Search results

TYPE OF PLASTIC

HTH in 4 studies

Hamstrings in 4 studies

Extra-articular graft with iliotibial band tenodesis in one study

Allograft in another study.

One study did not detail the surgical technique performed on the patients.

1991-2023

1110 patients

987 non-officers

123 officers

Clinic results

RETURN TO FULL DUTY (RTFD) RATE

The RTFD rate was reported in all studies. Homogeneity across studies was good (I2 = 0%, p = 1.00). **The overall RTFD rate among military personnel was 62.3%** (61.5% for the nonofficer group vs. 68.3% for the officer group), although this difference was not significant (p = 0.92).

Study or Subgroup	Nonofficers Events	Nonofficers Total	Officer Events	Officer Total	Weight	Risk Difference M-H, Fixed, 95% CI
Antosh 2018	221	466	2	4	4.2%	-0.03 [-0.52, 0.47]
Cullison 1998	81	105	11	15	13.9%	0.04 [-0.20, 0.28]
De Geofroy 2022	65	101	20	32	25.8%	0.02 [-0.17, 0.21]
Edwards 1991	54	78	24	34	25.1%	-0.01 [-0.20, 0.17]
Halford 2016	29	46	14	23	16.3%	0.02 [-0.22, 0.27]
Housni 2019	96	128	7	9	8.9%	-0.03 [-0.31, 0.25]
Tengku 2013	61	63	6	6	5.8%	-0.03 [-0.23, 0.16]
Total (95% CI)		**987**		**123**	**100.0%**	**0.00 [-0.09, 0.10]**
Total events	607		84			

Heterogeneity: $Chi^2 = 0.35$, df = 6 (P = 1.00); $I^2 = 0\%$

Test for overall effect: Z = 0.10 (P = 0.92)

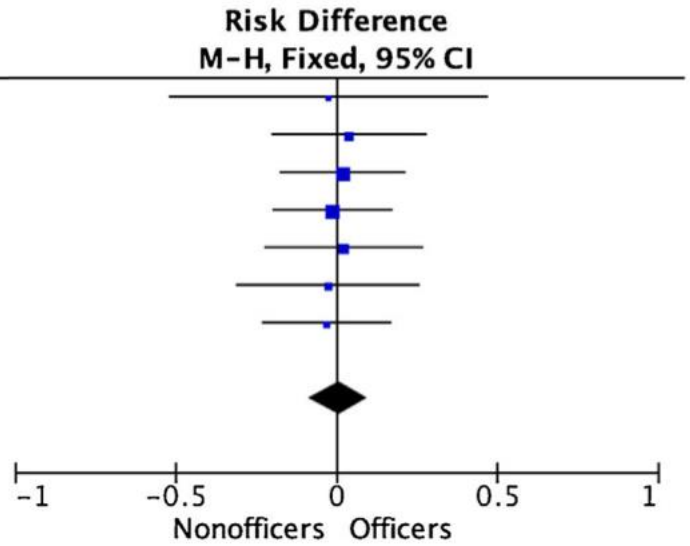


Figura 2 Diagrama de bosque de los resultados del regreso al servicio completo después de la reconstrucción de la rotura del ligamento cruzado anterior en el personal militar.

Clinic results

ASSOCIATED MENISCAL INJURY RATE

The overall rate of meniscal injuries associated with ACL tears was reported in six studies. Homogeneity was good (I2 = 0%, p = 0.99). The overall meniscal injury rate in military personnel was **58.8% (59.8% for the non-officer group vs. 49% for the officer group)**, although this difference was not significant (p = 0.88).

Study or Subgroup	Nonofficers Events	Total	Officer Events	Total	Weight	Odds Ratio M-H, Fixed, 95% CI
Antosh 2018	301	466	2	4	3.9%	1.82 [0.25, 13.07]
Cullison 1998	74	105	11	15	15.7%	0.87 [0.26, 2.94]
De Geofroy 2022	40	101	13	32	32.9%	0.96 [0.43, 2.16]
Edwards 1991	35	78	15	34	31.8%	1.03 [0.46, 2.32]
Housni 2019	89	128	6	9	9.4%	1.14 [0.27, 4.80]
Tengku 2013	24	63	2	6	6.2%	1.23 [0.21, 7.24]
Total (95% CI)		**941**		**100**	**100.0%**	**1.04 [0.66, 1.63]**
Total events	563		49			

Heterogeneity: $Chi^2 = 0.49$, df = 5 (P = 0.99); $I^2 = 0\%$
Test for overall effect: Z = 0.15 (P = 0.88)

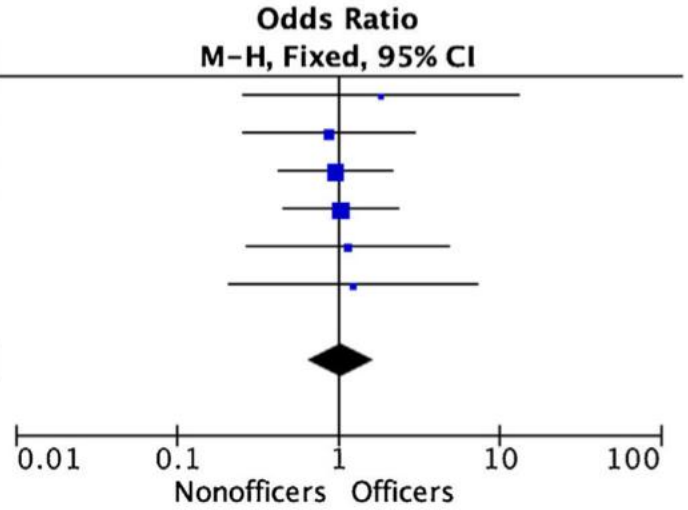


Figura 3 Diagrama de bosque de lesión meniscal asociada con la rotura del ligamento cruzado anterior en personal militar.

Clinic results

RATE OF ASSOCIATED CHONDROPATHY

The overall rate of chondropathy associated with ACL tears was reported in five studies. **The overall meniscal injury rate in military personnel was 32.2%** (32.4% for the non-officer group versus 29.4% for the officer group), although this difference was not significant (p = 0.9).

Study or Subgroup	Nonofficers Events	Total	Officer Events	Total	Weight	Odds Ratio M-H, Fixed, 95% CI
Antosh 2018	116	466	1	4	10.8%	0.99 [0.10, 9.65]
Cullison 1998	87	105	12	15	26.1%	1.21 [0.31, 4.72]
Edwards 1991	4	78	2	34	19.1%	0.86 [0.15, 4.96]
Housni 2019	41	128	3	9	27.6%	0.94 [0.22, 3.96]
Tengku 2013	24	63	2	6	16.4%	1.23 [0.21, 7.24]
Total (95% CI)		**840**		**68**	**100.0%**	**1.05 [0.50, 2.20]**
Total events	272		20			

Heterogeneity: $Chi^2 = 0.14$, df = 4 (P = 1.00); $I^2 = 0\%$

Test for overall effect: Z = 0.13 (P = 0.90)

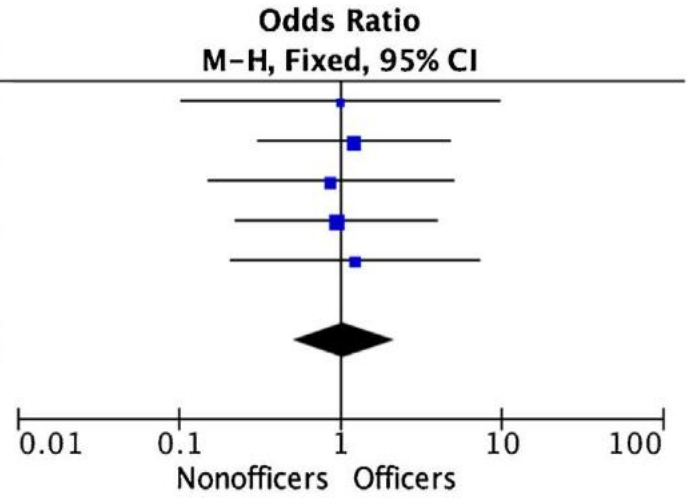


Figura 4 Diagrama de bosque de la condropatía asociada con la rotura del ligamento cruzado anterior en personal militar.

Conclusions

- Service in the armed forces involves intensive and physically demanding work in environmentally challenging settings.

- All the studies reviewed found a greater prevalence of these injuries in lower-ranking military personnel, likely associated with the greater physical demands of their regular military activities.

- Although the total number of ACL injuries is higher among non-commissioned military personnel than among officers, the differences between the two groups are not significant in the rate of RTFD (61.5% in non-commissioned officers vs. 68.3% in officers).

- The same is true for associated injuries, such as meniscal injury (59.8% in non-commissioned officers vs. 49% in officers) and associated chondropathy (32.4% in non-commissioned officers vs. 29.4% in officers).

- The selection of the best graft for ACL reconstruction remains a controversial issue for military personnel. The most commonly used grafts are hamstrings and hamstrings.

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