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Evaluation of the relationship between mini nutritional assessment-short form and prognostic nutritional index in individuals aged 80 years and older

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ABSTRACT

Objective: This study investigated the relationship between the Mini Nutritional Assessment-Short Form and the Prognostic Nutritional Index in clinically stable, community-dwelling individuals aged 80 years and older, while examining associations with chronic diseases and demographic characteristics.

Materials and Methods: The study was conducted with 167 elderly individuals registered at the Konya City Hospital Healthy Living Outpatient Clinic. Participants' demographic data, caregiver status, and chronic comorbidities were retrieved from patient medical records. Nutritional status was assessed using the Mini Nutritional Assessment-Short Form. The Prognostic Nutritional Index was calculated using serum albumin levels and total lymphocyte counts recorded in the hospital database within the preceding three weeks. Data analysis was performed using SPSS version 27.0. For variables with non-normal distribution, the Mann–Whitney U test and Spearman's correlation coefficient were employed.

Results: The median age was 85 years, with a high prevalence of multiple chronic conditions. No significant differences in Prognostic Nutritional Index values were found across Mini Nutritional Assessment categories ($p > 0.05$). The correlation between the Mini Nutritional Assessment and the Prognostic Nutritional Index was weak and not statistically significant ($r = 0.088$; $p = 0.260$). Furthermore, neither assessment showed significant associations with age, sex, or the total number of chronic diseases ($p > 0.05$).

Conclusion: Findings suggest that the Mini Nutritional Assessment and the Prognostic Nutritional Index reflect different dimensions of nutritional status in the very old and do not necessarily yield parallel results. In this age group, functional assessment tools may provide more discriminative information than biochemical parameters. Larger-scale studies are warranted to clarify the potential complementary use of these two methods in geriatric nutritional evaluation.

Keywords: nutritional assessment, nutritional status, geriatric population, aged, 80 and over

Introduction

Malnutrition plays a decisive role in determining morbidity and mortality in the advanced age group, as it substantially affects both physical and functional capacity. Age-related factors, such as sarcopenia, increased burden of chronic diseases, polypharmacy, loss of appetite, and decline in functional performance, significantly elevate the risk of malnutrition among older adults.[1] Considering that malnutrition serves as a precursor to numerous

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pathological conditions, either through direct or indirect pathways, its early detection and clinical management are paramount for optimizing patient outcomes in healthcare settings.[2] Previous studies have reported the prevalence of malnutrition in this population ranging between 15% and 29%.[3-5] Therefore, early identification of nutritional status in elderly individuals is crucial for preventing adverse clinical outcomes and for planning timely and appropriate interventions.

The Mini Nutritional Assessment–Short Form (MNA-SF) is one of the most widely used screening tools for detecting malnutrition in older populations, and its validity and reliability have been confirmed in numerous studies.[6-8] Incorporating multidimensional parameters such as weight loss, appetite, mobility, neuropsychiatric status, and body mass index, it provides a comprehensive evaluation of nutritional status in elderly individuals.

In contrast, the Prognostic Nutritional Index (PNI) is a simple yet effective immuno-nutritional marker based on serum albumin levels and total lymphocyte count. Initially introduced by Onodera and colleagues to predict surgical mortality, PNI has increasingly been utilized in geriatric populations in recent years.[9,10] While serum albumin is associated with chronic inflammation, liver function, and protein–energy malnutrition, lymphocyte count reflects immune response capacity. Accordingly, PNI has been shown to correlate with morbidity, risk of infection, frequency of hospitalization, and overall life expectancy.[9,11,12]

Although MNA-SF and PNI assess different physiological domains, both have been reported to be useful in identifying nutritional risk in older adults and to be associated with clinical outcomes. However, studies directly comparing MNA-SF and PNI are limited, and the nature of their relationship within the same population remains unclear. It has been suggested that MNA-SF offers a broader evaluation due to its focus on functional and behavioral components, whereas PNI primarily reflects biochemical and immunological status.[13] Evaluating these two methods together may therefore provide a more integrated perspective on nutritional status in elderly individuals.

Main Points

- Lack of Association: In clinically stable octogenarians, MNA-SF scores were not significantly correlated with PNI values or risk categories.
- Distinct Dimensions: Functional screening (MNA-SF) and immuno-nutritional markers (PNI) assess different physiological dimensions and may not yield parallel results in very old adults.
- Methodological Impact: High functional stability and ceiling effects in community-dwelling elders can limit the discriminatory capacity of standard PNI cutoffs.
- Multidimensional Need: Geriatric nutritional evaluation in octogenarians requires a comprehensive strategy combining both functional and population-specific biochemical indicators.

The present study aimed to examine MNA-SF and PNI values in individuals aged 80 years and older and to assess the relationship between these two nutritional measures. Additionally, the associations between nutritional status, chronic disease burden, and demographic variables were investigated to provide evidence regarding the use of practical and reliable nutritional screening tools in older adults. As the elderly population continues to grow, comparing nutritional assessment instruments and clarifying their role in clinical practice is increasingly important for the development of healthy aging policies.

Materials and Methods

This study is a retrospective, cross-sectional, and descriptive research conducted on clinically stable individuals aged 80 years and older, registered at the Konya City Hospital Healthy Living Outpatient Clinic, who exhibited no signs of active acute illness. Data were obtained through a retrospective review of records from scheduled home visits. Ethical approval for the study was granted by the KTO Faculty of Medicine Ethics Committee on January 29, 2026 (Decision No: 2026/34). A total of 167 elderly individuals, who were visited at their residences and whose information was recorded in patient files between August 1, 2024, and July 31, 2025, were included in the study. These participants represented a community-dwelling population evaluated during routine geriatric home visits, and their clinical stability was characterized by the absence of acute hospital-level complaints at the time of evaluation. Exclusion criteria consisted of severe cognitive impairment, active infection, and known malignancy. In addition, individuals were excluded if they had incomplete biochemical data, laboratory measurements obtained outside the 3-week period preceding the home visit, or incomplete clinical records.

A total of approximately 170 individuals were excluded, primarily due to missing or incomplete laboratory data. Due to the retrospective nature of the study and reliance on pre-existing hospital records, the exact number of excluded participants per category could not be systematically retrieved. Furthermore, history of systemic corticosteroid exposure could not be systematically screened or verified from the available retrospective records. Severe cognitive impairment was defined as a Mini-Mental State Examination (MMSE) score of <10, based on previously recorded assessments in patient medical records. Individuals with MMSE scores at or below this threshold were excluded from the study. Active infection was assessed clinically and supported by laboratory markers, including C-reactive protein (CRP), to exclude acute inflammatory conditions. Patients with known malignancy were excluded due to their potential impact on serum albumin levels and lymphocyte counts, which could confound PNI values.

Participants' demographic characteristics (age, sex), caregiver status (self-care, spouse, child/grandchild, professional caregiver), and the presence of chronic diseases (diabetes mellitus, hypertension, hyperlipidemia, coronary artery disease, dementia, thyroid disease, osteoporosis/osteoarthritis, asthma-COPD, chronic kidney disease, and cerebrovascular accident) were retrieved from patient records, along with Mini Nutritional Assessment (MNA-SF) scores obtained during the visits. Recent weight loss was not treated as an independent exclusion criterion, as it was already systematically evaluated and scored as a core component within the MNA-SF framework. Comorbidities were evaluated as the presence or absence of predefined chronic conditions and as the total number of comorbid diseases. No weighted comorbidity index or disease severity scoring system was applied due to the retrospective design of the study. For the biochemical data required to calculate the Prognostic Nutritional Index (PNI), serum albumin and lymphocyte counts performed within the three weeks preceding the visit date were screened via the hospital's electronic medical record system. Individuals whose laboratory tests exceeded this timeframe or were missing were excluded from the study. No new blood samples were collected within the scope of this research.

Nutritional assessment

Mini nutritional assessment (MNA-SF)

Nutritional status was evaluated using the Mini Nutritional Assessment–Short Form (MNA-SF). The MNA-SF consists of six components: appetite loss, weight loss, mobility, neuropsychiatric status, acute disease/stress, and body mass index or calf circumference.

Total scores range from 0 to 14 and were interpreted as follows:

- 12–14 points: Normal nutritional status
- 8–11 points: At risk of malnutrition
- 0–7 points: Malnutrition.[6]

Prognostic nutritional index (PNI)

PNI was calculated using serum albumin levels (g/L) and total lymphocyte count (10^3/μL) according to the following formula:

PNI = Albumin (g/L) + 5 × Lymphocyte count (10^3/μL)

Based on international literature:

- PNI ≥ 50: Normal nutritional status
- PNI < 50: Risk of malnutrition.[9]

The study was conducted in accordance with the principles of the Declaration of Helsinki.

Statistical analyses were performed using IBM Statistical Package for the Social Sciences (SPSS) for Windows, version 27.0. Descriptive statistics were presented as frequency (n) and percentage (%) for categorical variables; mean ± standard error for normally distributed continuous variables; and median with interquartile range (25th–75th percentile) for non-normally distributed variables. Normality was assessed using the Kolmogorov–Smirnov and Shapiro–Wilk tests. The Chi-square test was used to compare categorical variables. For continuous variables that were not normally distributed, the Mann–Whitney U test was applied. Correlations between numerical variables were analyzed using Spearman's correlation test. A p-value < 0.05 was considered statistically significant.

Table 1. Demographic and clinical characteristics of the study population

Age (years)	85 (83-88)	
Median (IQR)		
	%	**n**
Sex		
Female	67.1	112
Male	32.9	55
Caregiver status		
Self	15.0	25
Spouse	14.4	24
Child/grandchild	70.0	117
Professional caregiver	0.6	1
Chronic diseases*		
Diabetes mellitus	31.7	53
Hypertension	68.3	114
Hyperlipidemia	11.4	19
Coronary artery disease	28.1	47
Dementia	18.0	30
Thyroid disorders	3.6	6
Osteoporosis/osteoarthritis	9.0	15
Asthma–COPD	26.9	45
Chronic kidney disease	2.4	4
Cerebrovascular disease	5.4	9
MNA-SF score	12 (10-14)	
Median (IQR)		
PNI score	47.61 ± 0.48	
Mean± SE		

MNA-SF: Mini Nutritional Assessment; PNI: Prognostic Nutritional Index; COPD: Chronic Obstructive Pulmonary Disease
*More than one chronic condition could be selected
IQR: Interquartile range; SE: Standard error

Table 2. Comparison of PNI values according to MNA-SF groups

	MNA-SF ≥12	**MNA-SF <12**	**p**
PNI	47.20 (43.45-51.20)	48.30 (43.20-52.10)	0.979

MNA-SF: Mini Nutritional Assessment; PNI: Prognostic Nutritional Index

Table 3. Comparison of MNA-SF values according to PNI groups

	PNI ≥50	**PNI <50**	**p**
MNA-SF	12 (10-14)	12 (10-13)	0.658

MNA-SF: Mini Nutritional Assessment; PNI: Prognostic Nutritional Index

Table 4. Spearman correlations between MNA-SF, PNI, Age, and number of chronic diseases

	r	**p**
MNA-SF-PNI	0.088	0.260
MNA-SF-age	0.035	0.655
PNI-age	-0.036	0.643
MNA-SF- chronic diseases	-0.081	0.297
PNI- chronic diseases	-0.067	0.387

MNA-SF: Mini Nutritional Assessment; PNI: Prognostic Nutritional Index

Results

The median age of the participants was 85 years (interquartile range: 83–88). Of the study population, 67.1% were female. Hypertension was the most frequently observed chronic condition (68.3%). According to the MNA-SF classification, the majority of participants were within the normal nutritional range (Table 1).

PNI values were similar between individuals with normal nutritional status and those at risk of malnutrition according to the MNA-SF classification (p = 0.979) (Table 2).

MNA-SF scores were comparable between participants with low PNI (<50) and those with normal PNI (≥50), and no statistically significant difference was observed between the two groups (p = 0.658) (Table 3).

No significant correlations were found between MNA-SF and PNI, age, or the number of chronic diseases (r = 0.088, p = 0.260; r = 0.035, p = 0.655; r = –0.081, p = 0.297, respectively).

Similarly, no correlation was observed between PNI and age (r = –0.036, p = 0.643). In addition, there was no statistically significant association between PNI and the number of chronic diseases (r = –0.067, p = 0.387) (Table 4).

Table 5. Comparison of PNI levels according to the presence of comorbid diseases

Diseases	With disease – median (IQR) PNI	Without disease – median (IQR) PNI	p
Diabetes mellitus	48.20 (41.52-53.20)	47.52 (44.06-50.82)	0.662
Hypertension	47.30 (43.00- 52.10)	48.50 (43.75-51.75)	0.703
CAD	47.00 (43.00-50.50)	48.20 (43.50-52.25)	0.344
Dementia	46.70 (41.20-49.20)	48.25 (43.80-52.25)	0.084
Asthma–COPD	48.50 (45.00-50.70)	47.30 (43.00-52.10)	0.653

PNI: Prognostic Nutritional Index. IQR: Interquartile range CAD: Coronary Artery Disease COPD: Chronic Obstructive Pulmonary Disease

To further explore PNI as a continuous variable, a binary logistic regression analysis was conducted, treating continuous PNI as an independent predictor and the presence of malnutrition risk (MNA-SF < 12) as the dependent outcome. The analysis revealed that continuous PNI values were not significantly associated with the odds of being at risk for malnutrition (Odds Ratio [OR] = 1.002, 95% Confidence Interval [CI] = 0.941–1.066, p = 0.957).

No statistically significant differences were observed in PNI levels according to the presence of diabetes mellitus, hypertension, coronary artery disease (CAD), dementia, or asthma/COPD (p > 0.05) (Table 5).

Discussion

This study was conducted to explore the relationship between the Mini Nutritional Assessment (MNA-SF) and the Prognostic Nutritional Index (PNI) in individuals aged 80 years and older. Although the study population consisted of community-dwelling individuals followed in a Healthy Aging program, this should not be interpreted as a completely healthy cohort. A considerable proportion of participants had multiple chronic diseases, reflecting a multimorbid elderly population. However, as these individuals were clinically stable and not experiencing acute illness, variability in biochemical and functional parameters may have been relatively limited. This context may have contributed to the lack of significant associations observed. Given the lack of statistically significant associations and the low post-hoc statistical power observed in this cohort, any definitive conclusion regarding whether the MNA-SF and PNI reflect entirely different dimensions of nutritional status remains strictly hypothetical. While it is theoretically plausible that function-based tools and biochemical markers assess distinct physiological pathways, the observed lack of correlation cannot be confidently attributed to a true physiological divergence. Instead, it must be carefully weighed against the high probability of a Type II error due to sample size limitations. Therefore, our current data do not allow for a clear differentiation between a true absence of clinical overlap and an underpowered statistical artifact. An important characteristic of the study population was that all participants were clinically stable, community-dwelling individuals without active medical complaints. This context is particularly relevant, as biochemical indicators may not reflect acute physiological stress in such a stable population.

The absence of a statistically significant association between MNA-SF categories and PNI values is in line with previous studies reporting that functional nutritional measures and immunonutritional biomarkers do not always demonstrate parallel trends in elderly populations. Gong et al. demonstrated that functional measures such as MNA-SF and immunonutritional indicators like PNI do not necessarily correlate in orthopedic and neurosurgical patients.[14] Similarly, Ayraler et al. reported no significant relationship between PNI and nutritional status in their cohort.[10] These findings are consistent with the results of the present study.

Several contextual factors may help explain these observations. All participants were registered at a Healthy Aging Clinic and were clinically stable without acute complaints, which may have limited variability in both MNA-SF and PNI values. In addition, home-based assessments may have contributed to relatively preserved nutritional status, potentially reflecting adequate social support and family-based care. Furthermore, PNI was calculated using laboratory data obtained within a three-week window, reducing the likelihood of acute physiological fluctuations influencing biochemical parameters. Taken together, these factors may partly account for the observed lack of statistically detectable association in this cohort.

Although serum albumin has long been considered a marker of malnutrition, studies indicate that in older adults, it is also influenced by chronic inflammation, hydration status, liver function, and overall comorbidity burden.[15,16] Because our participants were clinically stable and not experiencing active disease exacerbations, large fluctuations in PNI values would not be anticipated. Furthermore, the prognostic value of PNI has been shown to be more pronounced in populations with malignancy, advanced organ failure, significant inflammatory burden, or acute catabolic states.[17-20] In such high-risk groups, PNI may more sensitively reflect disease progression and nutritional deterioration. In contrast, the largely stable and community-based nature of our cohort may have attenuated the discriminatory capacity of PNI. These findings suggest that while PNI may serve as a valuable monitoring tool in high-risk or progressive clinical conditions, function-based instruments, such as MNA-SF, may offer greater explanatory value in stable, community-dwelling elderly populations.

Similarly, lymphocyte count—another component of the PNI formula—is influenced by various non-nutritional factors in older adults, including chronic inflammation, infections, medications (e.g., corticosteroids), and immunosenescence associated with aging. Consequently, the lymphocyte multiplier included in the PNI calculation may not adequately capture nutritional status when considered in isolation in very old individuals.

The minimal and statistically non-significant correlation between MNA-SF and PNI may also be attributable to the functional independence of many participants and the strong family support structures observed within this population. Home-based evaluations indicated that participants generally maintained regular meal patterns, received social support, and had their care needs adequately addressed. The literature consistently emphasizes that living at home and receiving family support are associated with better nutritional outcomes in older adults.[21,22] This social context may have influenced overall nutritional status and contributed to reduced variability in both MNA-SF and PNI values.

The lack of significant associations between MNA-SF or PNI and age, sex, or total chronic disease burden further highlights the heterogeneity of the very old population. Among individuals aged 80 years and above, biological age and physiological reserve may vary substantially; therefore, the number of chronic conditions alone may not reliably determine nutritional risk.

This study has several limitations. Its single-center design and relatively modest sample size may limit the generalizability of the findings. A post-hoc power analysis indicated low statistical power (0.204), suggesting an increased risk of type II error. Therefore, the lack of statistically significant associations between MNA-SF and PNI should be interpreted with caution, as it may reflect limited statistical power rather than absence of a true relationship.

The PNI cut-off value (≥ 50), originally derived from surgical and oncological populations, may not be fully applicable or sufficiently discriminatory in very old, community-dwelling individuals. In the present cohort, the mean PNI value (47.61 ±0.48) indicates that a substantial proportion of stable participants fell below this surgical threshold without exhibiting functional malnutrition. To avoid the loss of statistical power associated with artificial categorization, we evaluated PNI as a continuous measure through Spearman's correlation analysis; however, no significant linear association was detected. This lack of significance strongly reinforces that standard tumor-associated or acute-care cut-offs suffer from a floor effect in stable geriatric screening setups. Population-specific, age-adjusted cut-off values are therefore urgently warranted in geriatric medicine to accurately capture subclinical nutritional deficits. Furthermore, the distributional characteristics of the MNA-SF within this cohort present an inherent statistical constraint that helps interpret the negative findings. The MNA-SF scores exhibited a notable ceiling effect, characterized by a high median score of 12 and a tight interquartile range (IQR 10–14), positioning a large proportion of the participants near the maximum possible score of 14. This skewed distribution severely limited the variance and statistical variability of the nutritional status data. Mathematically, a restricted variance and a prominent ceiling effect significantly diminish the statistical power of correlation coefficients, rendering the detection of potential linear relationships with the PNI highly improbable. Consequently, the observed lack of significant association must be interpreted not only as a potential clinical divergence but also as a statistical artifact resulting from restricted variability and a ceiling effect within this stable, community-dwelling geriatric sample.

Although MNA-SF was assessed at the time of home visits, serum albumin values used for PNI calculation were obtained from the 3-week period preceding the assessment. Given the retrospective design, this

approach was adopted to maximize data availability and to approximate biochemical status close to the time of functional evaluation. Considering the approximately 20-day half-life of albumin, this interval is unlikely to introduce major bias; however, a degree of temporal mismatch cannot be completely excluded.

Although C-reactive protein (CRP) values were available within the same time window, they were not systematically included in the analysis as an inflammatory covariate. Therefore, residual confounding due to subclinical inflammation may have influenced albumin and lymphocyte-related parameters, potentially affecting PNI interpretation. Future prospective studies incorporating structured, continuous inflammatory biomarkers like CRP as direct covariates are needed to better isolate the independent nutritional predictive value of the PNI.

Comorbidities were assessed based on presence or total number, without evaluation of severity or use of validated indices such as the Charlson Comorbidity Index. Given the heterogeneity of health status in individuals aged ≥80 years, this approach may not fully capture comorbidity burden and its relationship with nutritional status.

The use of the Mini Nutritional Assessment–Short Form (MNA-SF) instead of the full MNA-SF may have reduced sensitivity in relatively well-functioning older adults, potentially resulting in a ceiling effect and limiting variability in nutritional classification.

The reported prevalences of certain chronic comorbidities—such as chronic kidney disease (2.4%), thyroid disorders (3.6%), and osteoporosis/osteoarthritis (9.0%)—appear lower than standard geriatric epidemiological expectations for a cohort with a median age of 85 years. This discrepancy stems from the retrospective nature of our study; the comorbidity data were strictly gathered from hospital electronic health records and the national 'e-Nabız' system based on documented ICD-10 codes. In general health registry systems, secondary, stable, or subclinical chronic conditions are prone to under-documentation or under-coding during routine institutional encounters. Consequently, these rates reflect documented diagnostic codes rather than proactive, systematic clinical screening, which should be considered a form of documentation bias inherent to retrospective designs.

A substantial number of individuals (approximately 170) were excluded from the study primarily due to missing electronic records, incomplete laboratory parameters, or unresolvable data gaps. Because the exact baseline clinical characteristics and demographic distribution of these excluded individuals could not be retrieved due to the retrospective archive framework, a potential risk of significant selection bias must be acknowledged. It is highly plausible that these excluded patients represented a frailer, older, or more nutritionally vulnerable subgroup who may have been less capable of undergoing comprehensive screening or who suffered from severe acute comorbidities that led to incomplete documentation. Consequently, our final cohort might represent a relatively healthier or more stable survival sample, which could potentially limit the generalizability of our findings to the entire geriatric or malnourished population. This limitation underscores the need for future prospective, multi-center studies with comprehensive, consecutive patient enrollment to mitigate selection bias.

Strengths of the study include data collection through home visits, which reduces hospital-based selection bias, and the exclusive focus on individuals aged 80 years and older, a population that remains underrepresented in nutritional research. Overall, these findings suggest that MNA-SF and PNI reflect different dimensions of nutritional status in older adults, highlighting the multidimensional nature of geriatric nutritional assessment.

Conclusion

In conclusion, this study demonstrates no statistically significant correlation between MNA-SF and PNI categories or continuous scores in clinically stable individuals aged 80 years and older. However, due to the low post-hoc statistical power of our sample, it remains statistically uncertain whether this lack of association reflects a genuine conceptual independence between functional and immunonutritional dimensions or a limitation in sample size. Consequently, no definitive assertions can be made regarding the interchangeable or complementary nature of these tools based on our data alone. To resolve this ambiguity, adequately powered, large-scale prospective trials are required to rigorously evaluate the clinical interplay between functional screening tools and biochemical indices in geriatric populations.

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Author contributions

Conception: F.G.D.; Design: F.G.D.; Data acquisition: B.Ü.B.; Data analysis: B.Ü.B.; Data interpretation: B.Ü.B.; Drafting of the manuscript: B.Ü.B.; Critical revision of the manuscript: B.Ü.B., F.G.D.; All authors reviewed the results, approved the final version of the manuscript, and agreed to be accountable for all aspects of this study.

Ethical approval

This study was approved by the Ethics Committee of the KTO Faculty of Medicine (Date: January 29, 2026, Decision/Protocol No: 2026/34). Informed consent was obtained from all participants involved in this study.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflict of interest

The authors declare that this study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Generative AI statement

The authors declare that during the preparation of this study, the following AI-assisted technology was used: Gemini on 06/05/2026. Extent of Use: During the preparation of this work, the authors used Gemini for language support and editorial editing. The authors reviewed and edited the output as needed and take full responsibility for the content of the published article.. The authors confirm that they have critically reviewed and edited any AI-generated content and take full responsibility for the integrity, accuracy, and originality of the publication. The authors certify that the original human contribution is maintained and that AI-assisted tools are not listed or cited as authors.

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