

A Comparative Study of Nutritional Practices, Nutritional Awareness, and Barriers Among Male and Female Boxers of Kullu District, Himachal Pradesh

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Abstract— Nutrition is central to athletic performance, recovery, health, and safe weight management in combat sports. This comparative cross-sectional study examined nutritional awareness and nutritional practices among 60 under-19 district-level boxers from Kullu District, Himachal Pradesh, comprising 30 female and 30 male athletes selected through purposive sampling. Data were collected using structured questionnaires and analysed through descriptive statistics, Levene's test, independent-samples *t*-tests, Welch's correction where required, and Cohen's *d*. Female boxers recorded a higher nutritional awareness score ($M = 2.50$, $SD = 0.97$) than male boxers ($M = 2.17$, $SD = 0.70$), but the difference was not statistically significant, Welch's $t(52.6) = 1.52$, $p = .134$, $d = 0.393$. Female boxers demonstrated substantially better nutritional practices ($M = 26.50$, $SD = 4.36$) than male boxers ($M = 17.03$, $SD = 5.09$), $t(58) = 7.74$, $p < .001$, $d = 1.998$. The findings indicate that similar levels of awareness do not necessarily produce similar dietary behaviour. Practical nutrition education, accessible counselling, and

context-sensitive support are therefore recommended, particularly for young male boxers.

Keywords—boxing, combat sports, dietary behaviour, nutritional awareness, nutritional barriers, nutritional practices, sports nutrition.

I. INTRODUCTION

Req Boxing is a high-intensity combat sport that requires repeated explosive actions, sustained concentration, technical precision, and rapid recovery between training sessions and bouts. Appropriate nutrition supports energy availability, glycogen restoration, tissue repair, immune function, and body-composition management, making it an integral component of athletic preparation rather than an optional supplement to training [1]– [3].

The nutritional demands of boxing are complicated by weight-category requirements. Athletes may restrict food and fluid intake or employ rapid weight-loss practices to qualify for a lower category, even though severe energy restriction and dehydration can impair physiological function, cognition, mood, and performance. Evidence from combat-sport research therefore supports planned, gradual, and professionally supervised weight management [4], [5].

Carbohydrate availability is important for repeated high-intensity work, while adequate protein supports muscle repair and adaptation. Hydration is equally relevant because even modest fluid deficits can affect

endurance, reaction time, perceived exertion, and decision-making—capacities that are directly relevant to offensive and defensive actions in boxing [2]–[4].

Knowledge, however, does not automatically translate into behaviour. Reviews of athlete populations show that nutrition knowledge is frequently incomplete and that the association between knowledge and dietary quality is positive but modest. Food access, cost, convenience, training schedules, cultural preferences, family support, coaching advice, and online information may all shape what athletes actually eat [6]–[8].

Sex and gender may also influence dietary behaviour, access to guidance, body-image pressures, and the application of nutrition knowledge. Contemporary sports-nutrition literature emphasises that male and female athletes should be studied directly rather than assuming that one group represents the other, particularly during adolescence and early adulthood [11], [13].

II. RELATED LITERATURE & RESEARCH GAP

Heaney et al. concluded that athletes generally possess less nutrition knowledge than trained nutrition professionals and that differences in measurement instruments make comparisons across studies difficult. This observation is important because invalidated or poorly described questionnaires can obscure the distinction between general nutrition knowledge and sport-specific nutrition knowledge [6], [17].

Spronk et al. reported that female athletes scored higher than male athletes in both general nutrition knowledge and dietary quality, while the direct association between knowledge and diet quality remained weak. Their findings support the possibility that gender-related differences in eating behaviour

may be visible even when knowledge differences are small [7].

Vázquez-Espino et al. found that athletes obtain nutrition information from multiple sources and that attitudes, access to professional advice, and information quality influence dietary habits. Social-media exposure can expand access to information but may also increase exposure to unverified dietary claims and restrictive practices [8], [12].

Systematic reviews of nutrition education suggest that education programmes can improve knowledge and eating habits, although intervention effects differ according to programme duration, delivery mode, athlete characteristics, and the availability of individualised support. Education is most useful when it is combined with practical skills, food-environment changes, and follow-up reinforcement [9], [10].

Although sports nutrition and combat-sport weight management have been widely discussed, evidence concerning young district-level boxers from hilly regions of India remains limited. The food environment, travel distance, seasonal availability, household practices, and access to qualified sports dietitians may differ from those experienced by athletes in metropolitan or elite training centres. The present study addresses this contextual gap by comparing male and female boxers from Kullu District [5], [8].

III. AIM & OBJECTIVES

The study aimed to compare nutritional awareness, nutritional practices, and barriers to appropriate nutrition among male and female under-19 district-level boxers of Kullu District, Himachal Pradesh. The objectives were formulated to distinguish knowledge from behaviour and to identify areas requiring practical nutrition support [6]–[10].

- To assess and compare the daily nutritional practices of male and female district-level boxers.
- To assess and compare nutritional awareness among male and female district-level boxers.
- To identify the principal barriers that may hinder appropriate nutrition among young boxers.
- To examine whether observed gender differences are statistically and practically meaningful.

IV. METHODOLOGY

A. Research Design and Setting: A comparative cross-sectional descriptive design was used to examine nutritional awareness and practices in two naturally occurring groups at a single point in time. The reporting structure was aligned with relevant STROBE principles for cross-sectional studies, particularly a clear description of participants, variables, statistical methods, results, and study limitations [14].

B. Participants: The study included 60 under-19 district-level boxers from Kullu District, Himachal Pradesh, during the 2025–2026 session. Purposive sampling was used to select 30 female and 30 male boxers who were actively engaged in regular boxing training and competition. Eligibility required district-level representation, active participation in training, willingness to participate, and the absence of conditions that prevented questionnaire completion [14].

C. Instrument and Measures: Data were collected through a structured questionnaire covering nutritional awareness, routine nutritional practices, hydration, meal regularity, food selection, recovery-related eating, and perceived barriers to maintaining appropriate nutrition. Composite awareness and practice scores were used in the source dataset. Because the supplied manuscript did not report the item count, scoring range, or psychometric coefficients, the findings should be interpreted as

study-specific estimates rather than as population norms [6], [17].

D. Data-Collection Procedure and Ethical

Considerations: Permission was obtained from the relevant coaches, sports authorities, and institutions before data collection. Participants were informed of the purpose of the study and completed the questionnaire under standardized conditions with adequate time and clear instructions. Participation was voluntary, confidentiality was maintained, and assent or consent procedures were followed as applicable; the source manuscript did not specify an ethics-approval reference number [14].

E. Statistical Analysis: Descriptive statistics included the sample size, mean, median, standard deviation, and standard error. Levene's test assessed homogeneity of variance. Independent-samples t-tests compared female and male groups; Welch's t-test was used when the equal-variance assumption was violated. Statistical significance was set at $\alpha = .05$, and Cohen's d was reported to indicate practical magnitude in addition to p-values [15].

V. RESULTS

A. Descriptive Statistics:

Table 1: Descriptive Statistics for Nutritional Awareness and Nutritional Practices

Variable	Group	N	Mean	Median	SD	SE
Nutritional awareness	Female	30	2.50	2.50	0.974	0.178
Nutritional awareness	Male	30	2.17	2.00	0.699	0.128
Nutritional practices	Female	30	26.50	26.00	4.361	0.796
Nutritional practices	Male	30	17.03	17.00	5.089	0.929

Table I shows that female boxers had a slightly higher nutritional awareness mean than male boxers, whereas the difference in nutritional practice scores was much larger. Standard deviations indicated

moderate within-group variation, and the practice scores were more dispersed among male boxers. Descriptive differences should be considered together with inferential tests and effect sizes rather than interpreted independently [15].

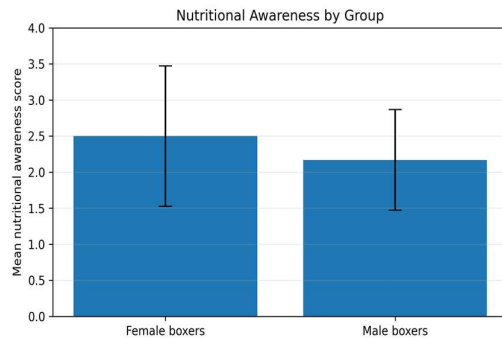


Fig. 1. Mean nutritional awareness scores with standard-deviation error bars.

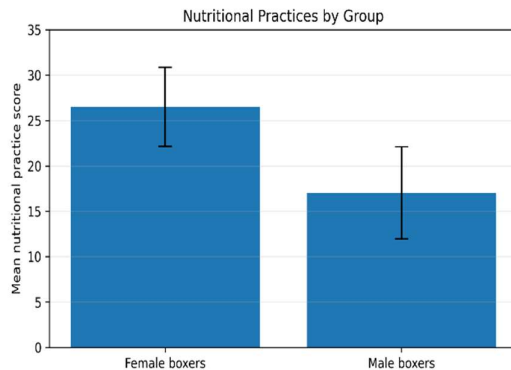


Fig. 2. Mean nutritional practice scores with standard-deviation error bars.

B. Homogeneity of Variance:

Table II
Levene's Test for Equality of Variances

Variable	F	df1	df2	p	Decision
Nutritional awareness	5.800	1	58	.019	Equal variances not assumed
Nutritional practices	0.471	1	58	.495	Equal variances assumed

Levene's test was significant for nutritional awareness ($p = .019$), indicating that the equal-variance assumption was not satisfied; therefore, Welch's result was used for the principal

interpretation. The test was not significant for nutritional practices ($p = .495$), so the conventional equal-variance t-test was appropriate for that comparison [15].

C. Independent-Samples Comparisons:

TABLE III
INDEPENDENT-SAMPLES t-TEST RESULTS

Variable	Test	t	df	p	Cohen's d	Interpretation
Nutritional awareness	Student's t	1.52	58.0	.133	0.393	Not significant
Nutritional awareness	Welch's t	1.52	52.6	.134	0.393	Not significant
Nutritional practices	Student's t	7.74	58.0	< .001	1.998	Significant
Nutritional practices	Welch's t	7.74	56.7	< .001	1.998	Significant

The awareness comparison was not statistically significant, Welch's $t(52.6) = 1.52$, $p = .134$. Although the female mean was higher, the observed standardized difference was small-to-moderate ($d = 0.393$) and did not provide sufficient evidence of a gender difference at the .05 level [15].

Nutritional practices differed significantly between groups, $t(58) = 7.74$, $p < .001$. Female boxers scored 9.47 points higher on average than male boxers, and the reported effect size was very large ($d = 1.998$). The result indicates both statistical significance and substantial practical separation between the group means [15].

D. Barrier-Related Observations: The questionnaire was described as including barriers to appropriate nutrition, such as availability, affordability, training schedules, travel, limited access to qualified guidance, and dependence on informal information sources. However, item-level barrier frequencies and gender-specific barrier scores were not included in the supplied results; consequently, no additional numerical comparison was created. Similar structural

and information-related barriers are recognized in athlete nutrition research [8], [12].

E. Summary of Statistical Decisions:

TABLE IV
SUMMARY OF GROUP-COMPARISON
FINDINGS

Outcome	Female Mean	Male Mean	Principal Test	Decision
Nutritional awareness	2.50	2.17	Welch's $t(52.6) = 1.52, p = .134$	No significant difference
Nutritional practices	26.50	17.03	$t(58) = 7.74, p < .001$	Significant difference
Nutritional barriers	Not reported	Not reported	Item-level data unavailable	Descriptive only

The combined pattern shows a knowledge behavior discrepancy: awareness levels were broadly comparable, while actual nutritional practices differed markedly. Because no individual-level correlation analysis was reported, the findings should not be interpreted as proving that awareness caused or failed to cause particular behaviors [7], [15].

VI. DISCUSSIONS

The non-significant difference in nutritional awareness suggests that male and female boxers were exposed to broadly similar levels of nutrition-related information. Shared coaches, training settings, peer networks, and media sources may have contributed to this convergence. Athlete knowledge studies similarly show that exposure to information is common but the depth and accuracy of knowledge vary considerably [6], [8].

The substantially higher nutritional practice scores among female boxers are consistent with evidence that female athletes may report better diet quality or healthier food-selection patterns than male athletes. Spronk et al. observed higher nutrition knowledge and diet-quality scores among female athletes,

although the association between knowledge and dietary quality was weak [7].

The present findings therefore support a distinction between knowing and doing. Nutritional behavior depends on motivation, convenience, food availability, family practices, finances, scheduling, and the credibility of advice. Education that merely supplies facts may be less effective than programme that include meal planning, label reading, hydration routines, recovery-food options, and strategies for travel and competition days [8]–[10].

For young boxers, this behavioral distinction is especially important because weight-category pressures can encourage restrictive eating and dehydration. Coaches and athletes require clear guidance that separates evidence-based weight management from unsafe rapid-loss practices. Regular monitoring, early referral, and realistic body-mass targets can reduce the pressure to use harmful methods close to competition [4], [5].

The female group's stronger practice scores should not be interpreted as evidence that female athletes have no nutrition-related vulnerabilities. Female athletes may face distinct concerns involving energy availability, iron status, menstrual health, body image, and social pressures; sex- and gender-responsive guidance remains necessary even when routine practices appear favorable [11], [13].

The very large practice-score effect is noteworthy but should be interpreted within the study context. The sample was purposively selected from one district, the questionnaire properties were not fully described, and cross-sectional comparisons cannot determine whether gender itself produced the observed difference. Replication with validated measures and multi-site sampling is required [14], [15].

VII. PRACTICAL IMPLICATIONS

Nutrition education for district-level boxers should combine short classroom sessions with practical

activities such as preparing affordable recovery meals, planning hydration, identifying reliable information sources, and creating competition-day food schedules. Systematic reviews indicate that structured education can improve knowledge and dietary behavior, particularly when repeated and tailored to the sporting context [9], [10].

Male boxers may benefit from targeted behavioral support because their awareness scores were not significantly lower, yet their practice scores were substantially poorer. Coaches should avoid assuming that information alone will change behavior and should instead monitor meal regularity, fluid intake, post-training recovery, and risky weight-control strategies [5], [8].

Local programs should account for the food environment of Kullu District by using accessible, culturally familiar, and affordable foods. Referral pathways to qualified sports-nutrition professionals, periodic parent or guardian engagement, and coach education could reduce dependence on peers and social media as primary sources of dietary advice [8], [12].

VIII. LIMITATIONS & FUTURE RESEARCH

The study has some limitations, including a small purposive sample from one district limiting generalizability. The group difference in a cross-sectional design does not allow temporal sequence or causation. The potential for recall and social-desirability bias also affects self-reported answers [14].

They were not reported in the source manuscript, which either provided no item count for the questionnaire, scored from samples of 20 items out of a maximum 25 (a score range would be helpful), presented preliminary reliability or validity evidence, and our intent was to quantify responses at an item-level by barrier. This means that absolute scores

cannot be fully interpreted and also limits cross-comparison of nutritional barriers. Future studies must utilize validated sport-nutrition instruments and report psychometric properties clearly [6], [17].

Suggestions for future research also include studying larger samples drawn from multiple districts, analyses by age group, weight-category information (weight-class or sport-type), training volumes, dietary recalls (e.g. 1-d food diaries) that inform more direct estimates of energy intake and expenditure in the same day, hydration measures (e.g. urine-specific gravity), and body-composition indicators such as skinfold thicknesses. Pragmatic studies with longitudinal or intervention designs would ultimately show whether education in practical terms enhances behavior and whether these changes contribute to improved recovery, safe weight management and boxing performance [9], [10].

IX. CONCLUSION

The study found no statistically significant gender difference in nutritional awareness among under-19 district-level boxers from Kullu District. In contrast, female boxers reported significantly better nutritional practices than male boxers, with a very large effect size. The findings demonstrate that broadly similar awareness can coexist with markedly different dietary behavior [7], [15].

Nutrition support for young boxers should therefore move beyond awareness campaigns and address practical barriers, routines, access to credible guidance, and safe weight-management behavior. Context-sensitive counselling and coach-supported monitoring may help athletes translate knowledge into consistent practice while protecting health and performance [5], [8]–[10].

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