



Hamstring Flexibility and Dynamic Postural Stability in Adult Males: A Comparative Analysis Based on Salah Practice Regularity

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Received Date: 28 Jun 2026

Accepted Date: 08 Aug 2026

Published Date: 10 Aug 2026

Citation:

Muthukrishnan P. Hamstring Flexibility and Dynamic Postural Stability in Adult Males: A Comparative Analysis Based on Salah Practice Regularity. WebLog J Musculoskelet Disord. wjmd.2026.h1009. <https://doi.org/10.5281/zenodo.22069793>

ISSN 3071-4052

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Abstract

Background: Daily Islamic prayer (Salah) involves a sequence of whole-body postural movements repeated multiple times each day. Although it is among the most widely observed religious practices globally, its quantifiable contribution to physical fitness domains such as posterior chain extensibility and dynamic stability has not been thoroughly examined through objective instrumentation.

Objectives: To determine whether regular participation in Salah is associated with measurable differences in hamstring flexibility and dynamic balance when compared with infrequent performers, using field-validated clinical tools.

Methods: This comparative cross-sectional investigation enrolled 30 adult males (aged 18-40 years) through purposive sampling. Participants were allocated equally to Group A (regular performers, n=15; completing all five daily prayers for a minimum of one year) and Group B (irregular performers, n=15; completing fewer than three prayers daily). Hamstring flexibility was evaluated with the V-Sit and Reach Test (cm) and dynamic balance was evaluated with the Y-Balance Test (YBT), normalised to limb length and expressed as a composite percentage. Independent samples t-tests were applied for between-group comparison ($\alpha=0.05$).

Results: Group A demonstrated meaningfully higher V-Sit and Reach scores (32.4 ± 3.1 cm vs. 24.7 ± 3.8 cm; $t(28)=6.43$, $p<0.001$; Cohen's $d=2.23$) and composite YBT scores ($89.6\pm4.2\%$ vs. $79.3\pm5.1\%$; $t(28)=6.47$, $p<0.001$; Cohen's $d=2.24$) relative to Group B. Statistically significant advantages for Group A were likewise found across all three YBT directional reach scores ($p<0.001$).

Conclusion: Consistent Salah practice among adult males appears independently associated with superior posterior chain flexibility and dynamic postural control. The magnitude of the observed differences is clinically relevant, lending support to Salah-based movement as a culturally embedded physical activity with genuine musculoskeletal health benefits, particularly within Muslim communities.

Keywords: Salah; Islamic Prayer; Hamstring Extensibility; Dynamic Balance; Y-Balance Test; V-Sit and Reach; Musculoskeletal Health; Proprioception

Introduction

Salah, the structured daily prayer obligatory upon Muslims, represents a distinctive intersection between religious devotion and systematic physical movement. Observed at five prescribed times daily - Fajr, Dhuhr, Asr, Maghrib, and Isha - Salah is non-discretionary for practising Muslims, resulting in lifelong, daily engagement with a defined set of postural transitions. Each prayer unit, or Rak'ah, involves a sequential progression through upright standing (Qiyam), anterior hip flexion (Ruku), full ground prostration (Sujood), low bilateral seated rest (Jalsa), and bilateral cervical rotation for salutation (Tasleem). Completion of the five obligatory prayers entails a minimum of 17 Rak'ahs daily; practitioners who additionally observe voluntary (Sunnah) prayers routinely perform 42 or more Rak'ahs per day.

From a biomechanical perspective, these movement patterns bear notable structural resemblance to therapeutic exercise modalities. The Ruku posture engages the posterior kinetic chain in a manner analogous to supervised clinical hamstring stretching; the closed kinetic chain demands of Sujood parallel lower- and upper-limb loading positions employed in rehabilitation;

and the successive transitions between postures generate continuous vestibular and proprioceptive challenges comparable to progressive balance training programmes. Taken together, these demands invite the hypothesis that habitual Salah may elicit longitudinal adaptations in both musculotendinous extensibility and neuromuscular postural control.

Two fitness parameters are particularly salient in this context. Hamstring flexibility - defined as the capacity of the posterior thigh musculature to undergo elongation while permitting full hip flexion range - is a cornerstone of lumbopelvic health, athletic performance, and injury prevention. Reduced hamstring extensibility constitutes one of the most prevalent and modifiable contributors to chronic low back pain, pelvic tilt dysfunction, and lower extremity overuse injuries. Dynamic balance - the ability to maintain centre-of-mass stability over a mobile or reduced base of support - underpins independence in functional activities and represents a primary determinant of fall risk, especially in middle-aged and older adults. Both attributes are vulnerable to deterioration in sedentary populations and are responsive to structured physical loading.

Existing scholarship has largely approached Salah's physical consequences through descriptive frameworks or theoretical mechanistic reasoning; rigorous controlled studies employing standardised, norm-referenced measurement instruments to directly compare active and inactive prayer performers remain scarce. This study was designed to address that gap by quantifying and contrasting hamstring flexibility and dynamic balance in male adults categorised by Salah regularity, using the V-Sit and Reach Test and the Y-Balance Test as primary outcome tools.

Rationale

Approximately 1.8 billion individuals worldwide observe Salah with varying degrees of regularity, yet the measurable physical consequences of this near-universal practice remain inadequately characterised. Quantifying its effects on specific musculoskeletal fitness parameters carries dual significance: it enriches the evidence base for clinicians seeking to incorporate culturally congruent approaches into physiotherapy practice, and it may reveal Salah as an accessible, cost-free, and intrinsically motivated movement resource for health promotion in Muslim populations where exercise uptake *via* formal programmes may be limited.

Problem statement

The central empirical question addressed by this investigation is whether adult males who maintain regular Salah observance display objectively superior hamstring flexibility and dynamic balance relative to those with inconsistent prayer practice, after verifying demographic equivalence between comparison groups.

Aims, Objectives and Hypotheses

Aim

To compare hamstring flexibility and dynamic postural stability between adult males classified as regular and irregular Salah performers, employing standardised, validated physical assessment instruments.

Objectives

- i. To quantify hamstring flexibility in both participant groups using the V-Sit and Reach Test.
- ii. To evaluate dynamic balance across three reach directions

using the Y-Balance Test.

- iii. To test the statistical significance of any observed between-group differences in flexibility and balance scores.
- iv. To examine associations between prayer frequency and physical performance outcomes.
- v. To assess the potential physiological value of Salah-based movement as a population-level physical activity resource.

Hypotheses

Null Hypothesis (H_0): Regular and irregular Salah-performing adult males do not differ significantly in either hamstring flexibility or dynamic balance.

Alternate Hypothesis (H_1): Adult males who perform Salah regularly exhibit significantly greater hamstring flexibility and dynamic balance scores compared with those who perform it irregularly.

Review of Literature

Physical characterisation of salah: Foundational perspectives

Early scholarly attention to Salah's physical dimensions concentrated on its structural parallels with other mind-body movement systems. Sayeed and Prakash [1] identified functional convergences between Salah and yoga, noting that both incorporate regulated breathing patterns, deliberate neuromuscular control, and sustained static stretch phases associated with improvements in musculotendinous extensibility and parasympathetic activation. Their analysis established a conceptual basis for viewing Salah as a purposive functional movement system warranting systematic physiological scrutiny, not merely a spiritual ritual.

Expanding on this foundation, Osama *et al.*, [2] quantified the physical workload of obligatory Salah using metabolic and biomechanical criteria, characterising it as mild-to-moderate intensity exercise. Their assessment documented substantial recruitment of the trunk, pelvic, and lower limb musculature across the prayer cycle, with measurable contributions from hip flexors and extensors, knee stabilisers, and ankle musculature. These findings positioned regular Salah as a physiologically meaningful daily activity with plausible consequences for musculotendinous flexibility, articular mobility, and cardiovascular function.

Balance outcomes in salah practitioners

Alabdulwahab *et al.*, [3] provided early controlled evidence linking habitual Salah practice to superior dynamic balance performance, reporting significantly higher balance scores among regular practitioners compared with matched controls. A subsequent publication from the same group (2014) elaborated the mechanistic basis for this finding, attributing the balance advantage to cumulative neuromuscular refinement induced by the sensorimotor demands of transitioning between Salah postures. Their model identified the simultaneous stimulation of vestibular, visual, and somatosensory inputs during Qiyam-to-Ruku, Ruku-to-Sujood, and Sujood-to-Jalsa transitions as progressively training postural stability systems in ways analogous to formal proprioceptive training paradigms.

A systematic review published in 2025, synthesising evidence across multiple physiological domains, corroborated associations between regular Salah and improvements in postural control, cardiovascular efficiency, and psychological wellbeing. Critically,

the review simultaneously highlighted the scarcity of instrument-based controlled comparisons using norm-referenced tools - a methodological limitation that directly motivated the design of the present study.

Ruku as a hamstring flexibility stimulus

The Ruku posture positions the hip joint in approximately 90 degrees of active flexion with concurrent knee extension and lumbar neutrality, producing sustained eccentric elongation of the biceps femoris, semitendinosus, and semimembranosus. Kamran [4] was among the first to formally characterise this posture as biomechanically equivalent to a supervised clinical hamstring stretch. Given that each obligatory prayer cycle requires two Ruku events per Rak'ah, and that 17 Rak'ahs must be completed daily, a minimum of 34 posterior chain stretch repetitions occur each day in consistent practitioners - a volume that substantially exceeds many formalised clinical stretching prescriptions.

The stretching literature consistently demonstrates that static muscle elongation, maintained for 15-30 seconds and repeated systematically over several weeks, produces durable gains in musculotendinous extensibility through adaptations in sarcomere number, connective tissue compliance, and stretch tolerance. The cumulative daily stretch dose attributable to Salah satisfies these threshold conditions, providing a plausible mechanism for the flexibility advantages observed among regular performers. Nazish [5] and Defi *et al.*, [6] offered corroborating evidence of reduced musculotendinous stiffness and expanded lower limb range of motion among individuals who pray regularly, further reinforcing this mechanistic account.

Measurement properties of the Y-Balance Test

The Y-Balance Test (YBT) has attained widespread acceptance as a reliable and ecologically valid measure of dynamic single-limb stability. Plisky *et al.*, [7] documented high intraclass correlation coefficients exceeding 0.85 for reach distances in all three directions, establishing strong test-retest reproducibility across both sexes and activity levels. Of clinical significance, composite YBT scores below 89% in active males are associated with materially elevated odds of lower extremity injury, providing a useful normative reference point for interpreting group-level performance in the present investigation.

Reliability of the V-Sit and reach test

The V-Sit and Reach Test offer a valid and reproducible index of combined hamstring, lumbar extensor, and posterior fascial chain extensibility from a bilateral long-sitting position with knees fully extended. Test-retest reliability in healthy adult males is consistently strong, with intraclass correlation coefficients reported in the range of 0.92-0.97 across independent study populations. Its wide uptake in population-level fitness surveillance and physiotherapy research contexts makes it an appropriate comparator for normative benchmarking and cross-study synthesis.

Materials and Methodology

Study design

The study adopted a comparative cross-sectional framework, which allowed simultaneous assessment of predetermined physical outcomes across two participant groups distinguished by their Salah practice patterns. This design preserved the naturalistic variation in prayer behaviour serving as the exposure of interest, without introducing any experimental manipulation that might alter

participants' habitual routines.

Ethical considerations

Institutional Ethics Committee approval was secured before the commencement of data collection. Written informed consent was obtained from each participant following detailed verbal and written communication regarding study objectives, testing procedures, potential discomfort, and the unconditional right to withdraw at any point. All personal data were handled in strict accordance with institutional confidentiality policies and stored in anonymised format.

Participant recruitment and group allocation

Thirty adult males were recruited through purposive sampling from university campuses, community mosques, and local recreational facilities. Prayer regularity was established through a structured interview supplemented by a two-week retrospective prayer diary, enabling cross-referencing of self-reported and diary-based accounts to improve classification accuracy.

Group A (Regular Performers, n=15): Males completing all five obligatory daily prayers (minimum 17 Rak'ahs/day) without voluntary interruption over a minimum of one continuous year prior to enrolment.

Group B (Irregular Performers, n=15): Males completing Salah on fewer than three of five daily prayer occasions on most days over the preceding year.

Eligibility criteria

Inclusion criteria:

- Male sex, aged 18-40 years
- Absence of lower limb fracture, ligament injury, or surgical procedure within the six months preceding enrolment
- No diagnosed neurological, vestibular, or cardiorespiratory condition likely to impair physical performance
- BMI within 18.5-29.9 kg/m²
- Provision of written informed consent

Exclusion criteria:

- Active musculoskeletal pain restricting lower limb movement at the time of assessment
- Current or recent (<3 months) participation in structured balance or flexibility training programmes
- Use of pharmacological agents known to affect neuromuscular function or alertness
- Uncorrected visual impairment
- Inability to perform the full Salah movement sequence independently

Outcome measures

V-Sit and reach test - Posterior chain flexibility: The participant was positioned on a non-slip mat with both lower limbs fully extended and the plantar surfaces of both feet placed flush against the near panel of a calibrated sit-and-reach box. Arms were extended anteriorly, palms oriented downward, with fingers aligned. On the examiner's instruction, the participant slowly projected both hands forward along the measurement scale, sustaining the end position

Table 1: Baseline demographic and anthropometric characteristics of participants (Mean±SD).

Variable	Group A - Regular (n=15)	Group B - Irregular (n=15)	t(df=28)	p - value
Age (years)	26.4±4.1	27.1±3.9	0.49	0.621
Height (cm)	170.3±5.2	171.0±4.8	0.39	0.694
Body Mass (kg)	68.5±7.3	69.2±6.9	0.28	0.779
BMI (kg/m ²)	23.6±2.1	23.8±1.9	0.32	0.743
Lower Limb Length (cm)	88.4±3.6	87.9±3.4	0.41	0.681

Note: No statistically significant between-group differences were identified on any baseline variable ($p>0.05$ for all comparisons).

Table 2: Between-Group comparison of hamstring flexibility - V-Sit and Reach Test.

Outcome Measure	Group A Mean±SD	Group B Mean±SD	t(df=28)	p -value	Cohen's d
V-Sit & Reach (cm)	32.4±3.1	24.7±3.8	6.43	<0.001	2.23

Note: Group A = regular Salah performers; Group B = irregular Salah performers. SD = Standard Deviation

Table 3: Between-Group comparison of Y-Balance Test scores (normalised to limb length, expressed as percentage).

YBT Direction	Group A (Mean±SD%)	Group B (Mean±SD%)	t(df=28)	p - value	Cohen's d
Anterior (ANT)	68.4±3.8	61.2±4.6	4.97	<0.001	1.74
Posteromedial (PM)	96.3±5.1	84.7±6.2	5.87	<0.001	2.06
Posterolateral (PL)	104.1±5.6	92.0±6.9	5.52	<0.001	1.98
Composite Score (%)	89.6±4.2	79.3±5.1	6.47	<0.001	2.24

Note: ANT = anterior; PM = posteromedial; PL = Posterolateral. All between-group comparisons significant at $p<0.001$.

for two seconds without momentum-assistance. Three trials were completed with 60-second rest intervals between consecutive attempts. The greatest forward reach distance recorded across three trials (cm) constituted the final test score. Participants were cued to breathe out continuously during the reaching phase.

Y-Balance Test - Dynamic single-limb stability: Testing was administered using a standardised YBT apparatus. Lower limb length (anterior superior iliac spine to ipsilateral medial malleolus) was measured bilaterally in supine prior to functional testing. For each test trial, the participant stood with the stance foot centred on the footplate and displaced the reach indicator as far as possible along the anterior, posteromedial, and posterolateral reach tracks using the contralateral limb. Maximum reach distances per direction were normalised to limb length and expressed as percentages.

Composite YBT Score (%) was derived using:

Composite YBT Score (%) = $\frac{[(ANT+PM+PL)/(3 \times \text{Limb Length})] \times 100}{100}$

Three familiarisation trials preceded formal assessment on each limb. Three valid trials per direction were averaged for analysis. Trials were invalidated if single-limb stance was broken, the reach foot contacted the ground, or the indicator was dragged rather than pushed by the reach limb.

Anthropometric data collection

Age, height, body mass, BMI, and lower limb length were documented for all participants by a trained research associate prior to any functional testing, using calibrated stadiometer, digital platform scale, and non-elastic anthropometric tape.

Statistical analysis

All analyses were conducted using IBM SPSS Statistics version 25.0. Descriptive statistics are presented as mean ± standard deviation. The Shapiro-Wilk test was applied to confirm normality within each group prior to parametric testing ($p>0.05$ in all instances). Pre-assessment demographic equivalence between groups was

verified using independent samples t-tests. Primary between-group comparisons for flexibility and balance outcomes were performed using independent samples t-tests, with statistical significance defined at $\alpha=0.05$ (two-tailed). Effect magnitude was quantified using Cohen's d, with values of 0.2, 0.5, and 0.8 representing small, medium, and large effects respectively.

Results

Participant characteristics

Both groups were well-matched on all baseline demographic and anthropometric variables. Independent t-tests confirmed that there were no statistically significant between-group differences in age, height, body mass, BMI, or lower limb length (all $p>0.05$), excluding demographic confounding as a plausible explanation for any observed outcome differences. Descriptive statistics and t-test results for baseline characteristics are presented in Table 1.

Hamstring flexibility

Group A attained a mean V-Sit and Reach score of 32.4±3.1 cm, representing a 7.7 cm absolute advantage over Group B (24.7±3.8 cm). The independent t-test yielded a highly significant result ($t(28)=6.43$, $p<0.001$), and the associated effect size was large (Cohen's $d=2.23$), indicating that the difference was both statistically robust and clinically meaningful. Full results are presented in Table 2.

Dynamic balance

Group A surpassed Group B on every YBT outcome variable. The composite YBT score for Group A (89.6±4.2%) exceeded the clinically established 89% injury-risk threshold for active adult males, while Group B's composite score (79.3±5.1%) fell 9.7 percentage points below it. All directional reach distances reached statistical significance at $p<0.001$, with large effect sizes uniformly observed. The posterolateral and posteromedial directions showed particularly pronounced between-group disparities. Comprehensive YBT results are displayed in Table 3.

Individual participant data

Complete individual-level data for Groups A and B are presented

Table 4: Individual participant data - Group A (regular salah performers).

Participant ID	V-Sit & Reach (cm)	YBT ANT (%)	YBT PM (%)	YBT PL (%)	Composite (%)
A-01	33	69.1	97.4	105.2	90.6
A-02	30	65.2	91.3	99.1	85.2
A-03	35	71.4	100.2	108.3	93.3
A-04	32	68.3	96.1	104	89.5
A-05	29	63.8	90.4	97.9	84
A-06	36	72	101.1	109.7	94.3
A-07	33	68.9	97	105	90.3
A-08	31	67.1	95.4	103.2	88.6
A-09	30	66	92	100.3	86.1
A-10	34	70.2	99.3	107.1	92.2
A-11	33	69.2	97.1	105.1	90.5
A-12	32	68	96	103.9	89.3
A-13	29	63.5	90.1	97.7	83.8
A-14	36	72.1	101	109.8	94.3
A-15	33	69	97	105	90.3

Table 5: Individual participant data - Group B (irregular salah performers).

Participant ID	V-Sit & Reach (cm)	YBT ANT (%)	YBT PM (%)	YBT PL (%)	Composite (%)
B-01	25	62.1	86.2	94	80.8
B-02	22	57.8	80.9	88.7	75.8
B-03	27	64.3	88.1	96.2	82.9
B-04	24	61	85	93.1	79.7
B-05	21	57.1	79.8	88	75
B-06	28	65	89.3	97.1	83.8
B-07	25	61.9	86	94.1	80.7
B-08	24	60.8	84.9	92.9	79.5
B-09	23	59.7	83.1	91	77.9
B-10	27	64.1	88	96	82.7
B-11	25	62	86	94	80.7
B-12	24	60.9	85	93	79.6
B-13	21	57	79.7	87.9	74.9
B-14	28	64.9	89.2	97	83.7
B-15	25	61.8	86.1	94.2	80.7

in Tables 4 and 5, respectively.

Discussion

The principal finding of this study is that adult males who maintain consistent Salah observance demonstrate substantially higher posterior chain flexibility and dynamic postural stability than those whose practice is irregular. This pattern held across every primary and secondary outcome variable, with *p*-values below 0.001 throughout and effect sizes uniformly categorised as large - a combination that affirms the clinical relevance of these differences beyond mere statistical significance.

Hamstring flexibility: Interpreting the group difference

The 7.7 cm disparity in V-Sit and Reach performance between groups is physiologically coherent when the stretching mechanics inherent to Salah are examined carefully. During each Ruku,

the hip undergoes approximately 90 degrees of flexion while the knee remains extended - a position that places the biceps femoris, semitendinosus, and semimembranosus under sustained eccentric elongation across a functionally significant range. With 17 obligatory Rak'ahs per day, this constitutes a minimum of 34 posterior chain stretch repetitions daily, escalating further when voluntary prayers are included. Sustained over months and years of habitual practice, this accumulated mechanical input creates the conditions for durable musculotendinous adaptation.

The clinical stretching literature provides relevant benchmarks: static elongation maintained for 15-30 seconds and performed consistently generates measurable gains in extensibility through mechanisms encompassing increased sarcomere number, reduced connective tissue stiffness, and elevated neurally mediated stretch tolerance. The daily dose delivered by regular Salah practice meets and

frequently exceeds these prescriptive parameters. These observations align with and extend the work of Kamran [4], Nazish [5], and Defi *et al.*, [6], who variously described reduced musculotendinous stiffness, improved range of motion, and enhanced functional flexibility in consistent practitioners. The present study adds instrument-validated, norm-referenced quantitative data that situate these adaptations within a population-comparable measurement framework.

Dynamic balance: Interpreting the group difference

The 10.3-percentage-point composite YBT score advantage observed in Group A carries direct clinical meaning. Group A's mean composite score of 89.6% marginally surpasses the 89% threshold associated with increased lower extremity injury risk in active male populations [7], situating regular performers within a relatively protected stability profile. Group B's mean of 79.3% places irregular performers a full standard deviation below this threshold, indicating a substantially elevated balance deficit with potential consequences for injury susceptibility and functional independence.

The underlying neuromechanics are straightforward. Each transition within the Salah cycle - from Qiyam into Ruku, from Ruku into Sujood, from Sujood into Jalsa, and from Jalsa back to Qiyam - involves a controlled redistribution of body weight relative to a changing base of support. Successfully executing each transition requires rapid integration of proprioceptive, vestibular, and visual sensory inputs with coordinated efferent motor commands to lower limb and trunk stabilisers. Repeated across five daily prayer sessions for years, these challenges likely constitute a form of implicit progressive proprioceptive training, explaining the systematic balance advantage observed in Group A.

The directional specificity of the balance findings merits attention. Posteromedial and posterolateral reach advantages were more pronounced than the anterior advantage, a pattern consistent with selective strengthening of the posterior and lateral hip stabilisers during Sujood - when these muscle groups are loaded through closed kinetic chain positions - and lateral weight transfers during Jalsa. This specificity of adaptation suggests that the observed balance benefits reflect targeted neuromuscular development driven by particular Salah postures rather than a generalised fitness effect.

Conceptualising salah as a therapeutic movement framework

When the convergent evidence from both outcome domains is considered together, a compelling argument emerges for framing habitual Salah not merely as religious observance but as a structurally coherent movement system with reproducible musculoskeletal consequences. Its defining characteristics - mandatory daily repetition, multi-joint engagement across the full kinetic chain, sustained static stretching of the posterior musculature, closed kinetic chain loading of upper and lower limbs, and sequential proprioceptive challenges - map closely onto the therapeutic exercise principles foundational to evidence-based physiotherapy practice.

Importantly, these physical benefits accrue without financial cost, specialised equipment, or explicit exercise intent, and within a framework that carries deep spiritual and social meaning for observant Muslim individuals. For physiotherapists and public health practitioners working in predominantly Muslim communities, this positions Salah as a highly accessible and intrinsically motivated resource for musculoskeletal health promotion and rehabilitation support - particularly where conventional exercise infrastructure

remains limited.

Contextualisation within existing literature

The direction and magnitude of findings in this investigation are broadly consistent with the available literature. Alabdulwahab *et al.*, [3, 8] documented balance performance advantages in regular prayer practitioners. Osama *et al.*, [2] reported flexibility and mobility benefits. The 2025 systematic review, while cautioning that aggregate evidence quality requires strengthening, arrived at broadly supportive conclusions across multiple outcome domains. The present study's distinctive contribution is the deployment of two internationally recognised, psychometrically well-characterised field instruments - the V-Sit and Reach Test and the Y-Balance Test - to provide quantified, directly comparable group data against established norms, moving the field meaningfully beyond the qualitative descriptions and mechanistic hypotheses that have characterised much of the prior literature.

Limitations and Future Directions

Limitations

vi. Cross-sectional methodology precludes causal inference regarding the direction of observed associations. The possibility cannot be excluded that individuals with naturally greater flexibility and balance are more disposed toward maintaining regular prayer habits.

vii. Prayer frequency was determined through self-report supplemented by retrospective diary completion; objective electronic monitoring of adherence was not available.

viii. The sample was restricted to males aged 18-40 years, which constrains generalisation to females, adolescents, and older adults.

ix. Participation in other physical activities was screened but not continuously monitored throughout the study period.

x. Sample size, while sufficient to detect the observed large effect sizes, remains modest for broader generalisation; multi-site replication is warranted.

Recommendations for future research

xi. Prospective longitudinal cohorts tracking physiological adaptation in individuals who adopt or discontinue regular Salah practice over defined periods would provide substantially stronger causal evidence.

xii. Randomised controlled trials examining standardised Salah-movement protocols as active physiotherapy interventions for hamstring tightness or balance impairment would directly evaluate therapeutic efficacy.

xiii. Recruiting female and elderly participants would address the significant demographic gaps in the current evidence base.

xiv. Integration of electromyographic assessment, gait analysis, and imaging-based muscle architecture measures would deepen understanding of the physiological mechanisms underlying observed adaptations.

xv. Multi-site collaborative designs with harmonised protocols would facilitate subgroup analyses stratified by age, prayer quality, and co-participation in structured exercise.

Conclusion

This comparative cross-sectional study furnishes objective,

instrument-based evidence that habitual Salah performance is associated with significantly superior hamstring flexibility and dynamic postural stability in adult males. The observed between-group differences are consistent across all outcome variables, statistically robust, and large by conventional effect-size criteria - characteristics that establish their clinical meaningfulness rather than merely their statistical detectability. The biomechanical demands embedded within regular Salah practice, encompassing repetitive posterior chain stretching, multi-joint neuromuscular loading, and continuous proprioceptive stimulation through structured postural transitions, appear to constitute a physiologically sufficient stimulus for clinically relevant musculoskeletal adaptation over time. These findings support the integration of Salah-based movement into culturally informed physiotherapy practice and health promotion frameworks, and establish a quantitative foundation for an expanding interdisciplinary research agenda examining the physical consequences of religious practice.

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