

A Gender Based Comparative Study to Assess the Flexibility through SFMA (Top Tier Movements) in Young Adults

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Abstract: *The Structural Functional Movement Assessment (SFMA) is used to assess movement patterns in order to identify relevant musculoskeletal dysfunction in a clinical population. SFMA is a movement based assessment tool designed for clinicians to diagnose the movement restrictions. SFMA is a whole body movement classification system that identifies non optimal movement performance requiring further assessment. Need of the Study: The study aims to compare the flexibility between males and females through SFMA. Aim of The Study: it is to compare the flexibility in young adults by using top tier movements of SFMA. Objectives and Methodology: This study compares the flexibility between males and females. 50 healthy individuals (25 females and 25 males) who fulfilled the inclusion criteria of age group between 19 to 25 years were selected. The individuals were asked to perform the top tier movements in SFMA. Based on their performance it was noted as 1 to 4. As 1 indicates the highest flexibility, 4 indicates least flexibility. This study was a onetime assessment it was assessed based on the movement performed by an individual. Results: The data was analyzed for normal distribution by using Kolmogorov-Smirnov and Shapiro-Wilk tests used for normality. Mann Whitney U test were used to compare the flexibility. The P value is 0.140 of normality test, hence the data was not normally distributed. A Mann Whitney U test was performed in which P value was 0.140, which indicates that there was no statistically significant difference in flexibility between males and females. Conclusion: The present study concludes that there was no significant difference in flexibility between males and females*

Keywords: Structural Functional Movement Assessment (SFMA), BodyMassIndex (BMI), Top tier movements, Flexibility

1. Introduction

The structural functional movement assessment (SFMA) is a functional movement method to observe movement restrictions in individuals by using top tier movements. The SFMA is a clinical model used to assist diagnosis and treatment of musculoskeletal disorders by identifying dysfunctions in movement patterns (14). SFMA not only used to assess the body pattern but also used as a functional training program for athletes, sports persons like soccer, weightlifting, running and baseball and other individuals (1, 5, 6, 7, 8, 9).

SFMA provides fitness and sports professionals with logical and reliable method for identifying the asymmetries, limitations, imbalances and weaknesses in healthy individuals (10, 11). SFMA is a whole body movement classification system that identifies non-optimal movement performance requiring further assessment. SFMA is also used to assess the healthy individuals (2).

SFMA is a quick functional movement assessment tool with intuitive, simple and clear instructions. SFMA is a popular assessment tool used to observe and detect components of dysfunctional movement patterns. SFMA is also used to identify impairments through the kinetic chain that may be contributing to movement dysfunction or pain (4). SFMA is also used to evaluate the pre sport screening have been shown to be effective in sports injuries prevention (12, 13).

The flexibility plays major role in day-to-day life in this study we are comparing the flexibility based on gender by using SFMA. Flexibility can be static or dynamic. Acute and chronic changes in flexibility are likely to occur with stretching exercises (2).

The purpose of this study was to compare the flexibility in both genders by using SFMA.

Many of the studies have been done on evaluating fitness of an individual by using SFMA but very few studies were done on gender comparison by using SFMA. Hence the need of the present study is to assess the flexibility in both genders by using SFMA.

Aim of the Study:

A gender based comparative study to assess the flexibility through SFMA (top tier movements) in young adults.

Objectives:

- To compare the flexibility between males and females through SFMA

Materials:

- SFMA score sheet
- SFMA movement map

2. Methodology

Study Setup: College of Physiotherapy, SVIMS university, Tirupati

Study Design: Comparative study

Sampling Method: Convenience sampling

Study Duration: Between May 2024 to July 2024

Sample size: 50

The study sample contains 50 young adults were included aged 19 to 25 of both males and female subjects were taken from the SVIMS, College of Physiotherapy, TIRUPATI. Who fulfilled the inclusion criteria were included in the study.

Inclusion Criteria:

- age 19 to 25 years
- normal healthy individuals
- both genders were included.

Exclusion Criteria:

- previous fractures
- any previous history of trauma
- any musculoskeletal disorders and dysfunctions
- any neurological conditions
- subjects who were willing to participate in the study

Outcome Measures:

SFMA score sheet is used to assess the flexibility.

Study Procedure:

50 healthy individuals were participated voluntarily in the study. Based on the gender group A: 25 females and group B: 25 males were included in the study. After obtaining informed consent from the participants. The participants performed the top tier movements of SFMA were used to assess the flexibility. This study was a onetime assessment it was assessed based on the movement performed by an individual.

The movement pattern was categorized in to 4 components i.e.

- 1) FN-functional non painful
- 2) FP-functional painful,
- 3) DP-dysfunction painful, 4. DN-dysfunctional non painful

After assessing the movement pattern of an individual it was compared statistically.

SFMA Evaluation:

This study consists of ten tier movements which include all the anatomical regions of the body through the utilization of the seven top tier assessments.

Anatomical regions of the body through the utilization of seven top tier assesments

Cervical patterns – Flexion, extension, rotation, Upper extremity patterns; medial rotation – extension pattern

(R+L), lateral rotation –abduction pattern (R+L), Multi segmental patterns: multi segmental flexion, multi segmental extension, multi segmental rotation, Single leg stance (R+L), Over head squat

The movement patterns are divided into;

- 1) Functional non painful (FN),
- 2) Functional painful (FP)
- 3) Dysfunctional painful (DP)
- 4) Dysfunctional non painful (DN)

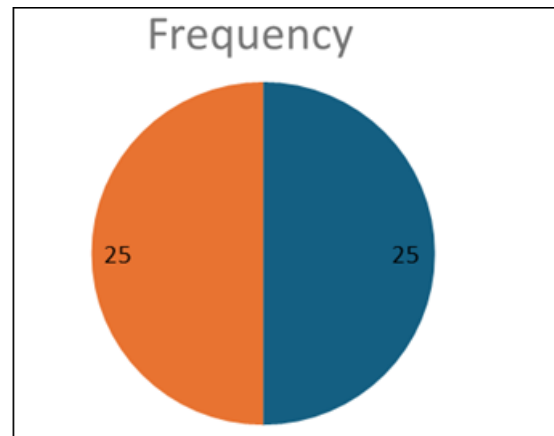
The data collection was taken between May and July 2024. The individuals were assessed separately without interaction with other subjects.

Statistical Analysis

The data was analyzed using the SPSS version 26 software. The data was analyzed for normal distribution. The descriptive data was presented as mean and standard deviation. MANN WHITNEY U test was used to written in the difference in flexibility between males and females. P value of 0.05 was considered as statistically significant.

3. Results

| Group | | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|-------|-----------|---------|---------------|--------------------|
| Valid | A | 25 | 50 | 50 | 50 |
| | B | 25 | 50 | 50 | 50 |
| | Total | 50 | 100 | 100 | 100 |



A- Females, B- Males

Descriptive

Descriptive Statistics

| | N | Minimum | Maximum | Mean | Std. Deviation |
|--------------------|----|---------|---------|-------|----------------|
| Height | 50 | 1.49 | 1.77 | 1.62 | 0.07 |
| Weight | 50 | 39 | 75.7 | 57.9 | 10.56 |
| BMI | 50 | 15.99 | 29.86 | 21.95 | 3.54 |
| SFMA | 50 | 14 | 28 | 18.44 | 4.43 |
| Valid N (listwise) | 50 | | | | |

Subjects included in the study were in the group between 19-25 yrs with mean Ht= 1.62±0.071, BMI=21.95±3.54, WT=57.90±10.56

| Group | | |
|-------|----------|--------|
| A | Height | 1.58 |
| B | Height | 1.66 |
| A | Weight | 52.24 |
| B | Weight | 63.56 |
| A | BMI | 20.916 |
| B | BMI | 22.99 |
| A | SFMA Tot | 19.4 |
| B | SFMA Tot | 17.48 |

A - Females, B- Males



Tests of Normality

Kolmogorov-Smirnov and Shapiro-Wilk tests both have p-values of 0.001, which means you reject the null hypothesis for both tests.

| | Kolmogorov-Smirnova | | | Shapiro-Wilk | | |
|--------------------------------------|---------------------|----|------|--------------|----|-------|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| SFMA | 0.301 | 50 | 0 | 0.77 | 50 | 0.001 |
| a Lilliefors Significance Correction | | | | | | |

| Test of significance | |
|------------------------------|------------|
| | SFMA TOTAL |
| Mann-Whitney U | 241.5 |
| Wilcoxon W | 566.5 |
| Z | -1.477 |
| Asymp. Sig. (2-tailed) | 0.14 |
| a. Grouping Variable: GENDER | |

2. Test statistics:

Mann-Whitney U = 241.500, Wilcoxon W = 566.500, Z = -1.477

Asymptotic Significance (2-tailed) = 0.140

The p-value (Asymp. Sig.) is 0.140, which is greater than the typical significance level of 0.05. This means that the difference in SFMA total scores between males and females is not statistically significant. In other words, while the ranks suggest that females may have poor flexibility than males.

Based on the Mann-Whitney U test, there is no statistically significant difference in flexibility (as measured by SFMA total score) between boys and girls (p = 0.140). Although the mean ranks indicate that females might have poor flexibility than males.

Conclusion: The data for SFMA does not follow a normal distribution

Mann-Whitney Test

| Gender | Ranks | | | |
|------------|---------|----|-----------|--------------|
| | | N | Mean Rank | Sum of Ranks |
| SFMA Total | Males | 25 | 22.66 | 566.5 |
| | Females | 25 | 28.34 | 708.5 |
| | Total | 50 | | |

Males

Number of participants (N) = 25, Mean Rank = 22.66, Sum of Ranks = 566.50

Females:

Number of participants (N) = 25, Mean Rank = 28.34, Sum of Ranks = 708.50

Interpretation: Mean rank for females (28.34) is higher than that for males (22.66), 34 suggesting that females, on average, have higher SFMA total scores compared to males. Since higher SFMA scores indicate poor flexibility, this suggests that females might have poor flexibility than males.

4. Discussion

SFMA is an evaluation of functional model of functional movement for physicians and healthcare professionals to help individual causes of pain due to musculoskeletal problems.

This observational study aimed to analyze SFMA reliability when used by a physiotherapy student with a short period of formation.

Pre-existing studies assert that SFMA presents adequate reliability when performed by experienced raters [17, 18, 19].

Despite low experience and limited SFMA training, the results showed that inter and intra-rater reliability degree for the student ranges from moderate to good (0.49 and 0.62, respectively).

In 2019, Stanek organized a study with the same focus, although evaluations were conducted live by three raters with varying degrees of experience [17]. Despite these differences between live and video evaluation, the rater B inter-rater reliability degree is comparable to all three raters from Stanek's study the results show that some movements have a higher degree of reliability compared to others.

Bannigan and Watson in 2009 stated SFMSA is an evaluation tool, it is necessary to define in which measure said tool is reliable, valid and usable [16].

A recent study proposes the Arm Care Screen (ACS) as a new tool based on the concepts of the SFMA in high school coaches stated that usefulness of SFMA in the evaluation of painful athletes underlying how SFMA helps identifying problems related to mobility and stability in certain specific patterns of movement [15].

Zarogaza28 in 2004 stated that flexibility decreased with age.

Bale14 and Maffuli23 stated that flexor muscle performance was more in females by taking 410 subjects.

Navvaro weinck21 and Porta mentioned that greater flexor muscle is higher in females compared males due to differences between the sexes lies in hormonal variation i.e. oestrogen levels are higher in among women.

5. Limitations

- The sample size was small as this was observational study large sample should be included.
- No therapeutic interventions were included in the study to compare flexibility.
- Not trained to use SFMA assessments.

6. Future Recommendations

The future study is recommended with a large sample size and use interventional study to evaluate the therapeutic measures on outcomes by assigning participants to compare the flexibility between males and females.

The same study can be done gender based by including the therapeutic interventions. The study can also be done in uni gender, in geriatric population, in athletes. This study can be done on athletes by including. The therapeutic intervention by comparing pre and post SFMA score comparison. The

study can be also used in comparison between athletes and non athletes.

7. Conclusion

In this study conducted on 25 males and 25 females to compare the flexibility by using the top tier movements in SFMA, revealed that there is no statistical difference in flexibility between males and females.

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