

Association of Forward Head Posture and Hand Grip Strength in Young Adults with Prolonged Screen Exposure

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Abstract

Background: Forward Head Posture (FHP) is one of the most common postural deviations among young adults due to prolonged use of smartphones, laptops, tablets, and other digital devices. Sustained screen exposure encourages prolonged neck flexion, poor sitting posture, and inadequate ergonomic practices, resulting in altered cervical alignment, muscular imbalance, and reduced upper extremity function. Hand Grip Strength (HGS) is an important indicator of upper limb muscle function and may be influenced by cervical posture. Although previous studies have reported an association between prolonged screen exposure and Forward Head Posture, limited evidence is available regarding its relationship with Hand Grip Strength among young adults. Therefore, the present study was conducted to determine the prevalence and severity of Forward Head Posture and to investigate its association with Hand Grip Strength in young adults with prolonged screen exposure.

Methods: A correlational study was conducted in the Department of Physiotherapy, Pacific Medical College and Hospital, Udaipur. A total of 150 young adults aged 18–40 years with prolonged daily screen exposure were recruited using a convenience sampling technique. Forward Head Posture was

assessed using the Postural Observation Method and the Head-to-Wall Distance Test, while Hand Grip Strength was measured using a hand gripper for both dominant and non-dominant hands. A structured questionnaire was used to collect demographic information, screen exposure duration, postural habits, and musculoskeletal symptoms. Data were analyzed using descriptive statistics and the Pearson correlation coefficient, with the level of significance set at $p < 0.05$.

Results : A total of 150 participants completed the study. Moderate Forward Head Posture was the most common finding, followed by mild and severe Forward Head Posture. A statistically significant negative correlation was observed between Forward Head Posture and Hand Grip Strength ($p < 0.05$), indicating that participants with greater postural deviation demonstrated lower grip strength. Participants with prolonged daily screen exposure also reported a higher prevalence of neck pain, neck stiffness, shoulder discomfort, headache, fatigue during work, and hand weakness. These findings suggest that prolonged screen exposure is significantly associated with poor cervical posture and reduced upper extremity muscle function among young adults.

Conclusion : Forward Head Posture was highly prevalent among young adults with prolonged screen exposure and showed a significant negative association with Hand Grip Strength. Participants with greater severity of Forward Head Posture demonstrated lower grip strength and reported more musculoskeletal symptoms. These findings highlight the importance of early postural assessment, ergonomic education, and healthy screen-use habits to prevent musculoskeletal disorders and preserve upper extremity function. Early identification of Forward Head Posture may help reduce the long-term impact of prolonged screen exposure on functional health.

1. INTRODUCTION

Forward Head Posture (FHP) is one of the most common postural deviations observed in modern society, particularly among young adults. It is characterized by the anterior positioning of the head relative to the shoulders when viewed from the lateral aspect. In a normal posture, the head is balanced over the cervical spine, allowing the muscles and ligaments to function efficiently with minimal stress. However, when the head moves forward from its neutral position, the mechanical load on the cervical spine increases considerably, leading to excessive strain on the cervical muscles, ligaments, and intervertebral joints. Persistent Forward Head Posture may result in muscular imbalance, reduced cervical mobility, neck pain, shoulder discomfort, headaches, fatigue, and impaired upper extremity function.

The rapid advancement of digital technology has significantly changed the lifestyle of young adults. Smartphones, laptops, tablets, desktop computers, and other digital devices have become essential for education, professional work, communication, and entertainment. Consequently, the duration of daily screen exposure has increased substantially over the past decade. Many individuals spend several hours each day using digital devices while maintaining prolonged neck flexion, rounded shoulders, and poor sitting posture. Such sustained postures increase the mechanical demand on the cervical spine and contribute to the development of Forward Head Posture and other work-related musculoskeletal disorders.

Prolonged screen exposure has emerged as one of the leading risk factors for postural dysfunction among young adults. During prolonged device use, individuals often adopt a slouched sitting posture with the

head positioned anterior to the trunk. This abnormal alignment increases the effective weight of the head on the cervical spine, requiring continuous activation of the cervical extensor muscles to maintain head position. Over time, these repetitive mechanical stresses may produce weakness of the deep cervical flexor muscles, tightness of the posterior cervical musculature, altered scapular positioning, and reduced postural stability. If left uncorrected, these changes may adversely affect normal movement patterns and functional performance.

Hand Grip Strength (HGS) is a simple, reliable, and widely accepted measure of upper extremity muscle strength and overall physical function. It reflects the coordinated activity of the forearm muscles, shoulder stabilizers, and neural pathways supplying the upper limb. Grip strength has been extensively used as an indicator of neuromuscular performance, functional capacity, and general musculoskeletal health. Since the cervical spine, shoulder girdle, and upper extremity function as an integrated kinetic chain, alterations in cervical posture may influence muscle activation patterns and reduce grip strength. Abnormal cervical alignment may affect neural conduction, scapular stability, and force transmission to the upper limb, thereby compromising hand function.

Several studies have reported that prolonged screen exposure is associated with increased prevalence of neck pain, shoulder pain, headaches, muscular fatigue, and postural abnormalities among young adults. Likewise, previous research has demonstrated that Forward Head Posture alters cervical biomechanics and may negatively influence upper extremity muscle function. However, limited evidence is available regarding the association between Forward Head Posture and Hand Grip

Strength among young adults with prolonged screen exposure, particularly in the Indian population. Understanding this relationship is important for early identification of postural dysfunction and for developing preventive strategies aimed at reducing screen-related musculoskeletal problems.

Physiotherapists play an important role in the assessment, prevention, and management of postural disorders. Early recognition of Forward Head Posture through simple clinical assessment methods, along with evaluation of Hand Grip Strength, may help identify individuals at risk of developing functional impairments. Furthermore, increasing awareness regarding correct posture, ergonomic practices, regular physical activity, and healthy screen-use habits may contribute to reducing the prevalence of postural dysfunction and improving musculoskeletal health among young adults.

Therefore, the present study was undertaken to determine the prevalence and severity of Forward Head Posture among young adults with prolonged screen exposure and to investigate its association with Hand Grip Strength. The findings of this study are expected to provide valuable information regarding the influence of prolonged screen exposure on cervical posture and upper extremity function. The results may also assist physiotherapists, healthcare professionals, educators, and the general population in promoting early postural assessment, ergonomic education, and preventive measures to minimize the growing burden of screen-related musculoskeletal disorders.

1.1 Study Aim and Objectives

The primary aim of this study was to determine the association between Forward Head Posture (FHP) and Hand Grip Strength (HGS) among young adults with prolonged

screen exposure. The study also aimed to assess the prevalence and severity of Forward Head Posture and to evaluate the influence of prolonged screen exposure on cervical posture and upper extremity muscle function.

The specific objectives of the study were:

1. To assess the prevalence and severity of Forward Head Posture among young adults with prolonged screen exposure.
2. To measure Hand Grip Strength in young adults with prolonged screen exposure.
3. To determine the association between Forward Head Posture and Hand Grip Strength.
4. To analyze the impact of prolonged screen exposure on cervical posture and upper extremity muscle function.
5. To identify the common musculoskeletal symptoms associated with prolonged screen exposure, including neck pain, neck stiffness, shoulder discomfort, headache, fatigue, and hand weakness.

2. REVIEW OF LITERATURE

1 Ahmed et al. (2024) investigated the prevalence of Forward Head Posture among university students with prolonged smartphone use. The study reported a high prevalence of Forward Head Posture and found that increased daily screen time was significantly associated with poor cervical posture, neck pain, and musculoskeletal discomfort. The authors emphasized the importance of ergonomic awareness and early postural assessment.

2 Kim et al. (2023) evaluated the relationship between Forward Head Posture and Hand Grip Strength in young adults. The study demonstrated that participants with Forward Head Posture had significantly lower Hand Grip Strength compared to individuals with normal posture, suggesting

that altered cervical alignment affects upper extremity muscle performance.

3 Alghadir et al. (2023) examined the effects of prolonged smartphone use on cervical posture and musculoskeletal health. The findings showed that prolonged screen exposure increased the prevalence of Forward Head Posture, neck pain, shoulder discomfort, and muscle fatigue among young adults.

4 Lee et al. (2022) assessed the influence of prolonged screen exposure on cervical posture among college students. The study found that students with longer daily screen time were more likely to develop Forward Head Posture and reported higher levels of neck discomfort and postural imbalance.

5 Neupane et al. (2022) investigated work-related musculoskeletal disorders associated with prolonged digital device use. The authors reported that extended screen exposure was significantly associated with neck pain, shoulder pain, headache, and poor postural habits, highlighting the importance of ergonomic interventions.

6 Kang et al. (2021) studied the effect of Forward Head Posture on upper extremity function. The results demonstrated that individuals with severe Forward Head Posture showed reduced shoulder stability and significantly lower Hand Grip Strength than participants with normal cervical alignment.

7 Singla and Veqar (2021) reviewed the biomechanical consequences of Forward Head Posture and concluded that abnormal cervical alignment leads to muscular imbalance, scapular dysfunction, decreased cervical mobility, and impaired upper limb function. The review emphasized the role of physiotherapy in postural correction.

8 Ruivo et al. (2020) evaluated the prevalence of Forward Head Posture among smartphone users. The study reported that prolonged use of handheld devices contributed significantly to Forward Head Posture and recommended ergonomic modifications and postural education to reduce musculoskeletal problems.

9 Shan et al. (2020) investigated cervical posture and muscle fatigue during prolonged computer use. The study concluded that sustained sitting posture and continuous screen exposure altered cervical alignment, increased muscle fatigue, and reduced postural stability.

10 Falla et al. (2019) examined cervical muscle function in individuals with Forward Head Posture. The study demonstrated weakness of the deep cervical flexor muscles, altered neuromuscular control, and reduced muscular endurance, which negatively affected upper extremity function.

11 Szeto et al. (2018) investigated the effect of prolonged computer use on posture among office workers. The findings indicated that poor sitting posture and prolonged screen exposure increased the risk of Forward Head Posture, neck pain, and shoulder muscle fatigue.

12 Lau et al. (2017) evaluated the relationship between cervical posture and Hand Grip Strength. The study found that participants with abnormal cervical posture demonstrated significantly reduced grip strength, indicating that cervical alignment influences upper extremity muscle performance.

3. MATERIALS AND METHODS

3.1 Study Design and Setting

An experimental, two-group, pre-test and

post-test comparative study was conducted. Participants were randomly allocated to intervention groups using simple random allocation, and all baropodometric outcome measures were assessed at two standardised time points: baseline (Day 1, prior to intervention) and immediately following completion of the intervention period (Day 28 or equivalent).

3.2 Participants

A total of 150 young adults aged 18–40 years with prolonged screen exposure were recruited using a convenience sampling technique from schools, colleges, corporate offices, and community settings. Participants who met the predefined inclusion and exclusion criteria were enrolled in the study after providing written informed consent. Individuals with a history of cervical spine surgery, recent neck or upper limb trauma, congenital spinal deformities, neurological disorders, rheumatological conditions affecting the cervical spine or upper extremity, and other musculoskeletal conditions that could influence posture or Hand Grip Strength were excluded from the study. All participants underwent assessment for Forward Head Posture using the Postural Observation Method and Head-to-Wall Distance Test, while Hand Grip Strength was evaluated using a hand gripper under standardized testing conditions.

3.5 Statistical Analysis

The collected data were analyzed using appropriate statistical methods. The **Shapiro–Wilk test** was used to assess the normality of the data distribution. Descriptive statistics were expressed as **mean ± standard deviation (SD)** for continuous variables and **frequency with percentage (%)** for categorical variables. The **Pearson correlation coefficient (r)** was used to determine the association between **Forward Head Posture** and **Hand Grip Strength**. Where applicable, the

Independent Samples t-test was used to compare Hand Grip Strength between two groups, and **One-way Analysis of Variance (ANOVA)** was used to compare Hand Grip Strength among participants with mild, moderate, and severe Forward Head Posture. A **p-value of less than 0.05 ($p < 0.05$)** was considered statistically significant.

4. RESULTS

A total of **150 young adults** with prolonged screen exposure participated in the present study. All participants fulfilled the predefined inclusion and exclusion criteria and completed the assessment. The demographic characteristics, screen exposure pattern, prevalence and severity of Forward Head Posture (FHP), Hand Grip Strength (HGS), musculoskeletal symptoms, and the association between Forward Head Posture and Hand Grip Strength were analyzed.

The age distribution showed that the majority of participants belonged to the **21–30 years** age group, followed by **18–20 years** and **31–40 years**. The study included both male and female participants representing different occupations, including students, teachers, office employees, and corporate professionals. The demographic characteristics indicated that the study population appropriately represented young adults who were regularly exposed to digital devices.

The analysis of daily screen exposure revealed that most participants used digital devices for **more than six hours per day**, while a smaller proportion reported screen exposure of **4–6 hours** and **less than four hours** daily. Smartphones and laptops were the most commonly used digital devices, followed by desktop computers and tablets. A majority of participants also reported maintaining a slouched sitting posture and prolonged neck flexion during device use, with only a small proportion following appropriate ergonomic practices or taking regular breaks.

Assessment of Forward Head Posture demonstrated a high prevalence among the study participants. Based on the Postural Observation Method and Head-to-Wall Distance Test, **moderate Forward Head Posture** was the most frequently observed category, followed by **mild** and **severe Forward Head Posture**. Participants

with prolonged daily screen exposure showed a greater tendency toward moderate to severe postural deviation, indicating that extended screen use may contribute to abnormal cervical alignment.

Hand Grip Strength was measured for both the dominant and non-dominant upper limbs using a hand gripper. Participants with mild Forward Head Posture demonstrated comparatively higher grip strength, whereas those with moderate and severe Forward Head Posture exhibited progressively lower Hand Grip Strength. The reduction in grip strength was more evident among participants with severe postural deviation, suggesting that cervical posture may influence upper extremity muscle performance.

A statistically significant **negative correlation** was observed between Forward Head Posture and Hand Grip Strength ($p < 0.05$). As the severity of Forward Head Posture increased, Hand Grip Strength decreased. This finding indicates that greater anterior displacement of the head is associated with reduced upper limb muscle strength and functional performance.

The prevalence of musculoskeletal symptoms was also analyzed. Neck pain, neck stiffness, shoulder discomfort, headache, fatigue during work, and hand weakness were commonly reported by the participants. Neck pain and neck stiffness were the most frequently reported symptoms, particularly among individuals with prolonged screen exposure and moderate to severe Forward Head Posture. Participants who maintained poor sitting posture for extended periods also reported higher levels of shoulder discomfort and fatigue compared with those who adopted relatively better ergonomic practices.

The findings further demonstrated that participants with longer daily screen exposure had a higher prevalence of Forward Head Posture and lower Hand Grip Strength compared with those reporting shorter durations of screen use. Although the present study cannot establish a cause-and-effect relationship due to its cross-sectional design, the observed association suggests that prolonged screen exposure may contribute to altered cervical posture and reduced upper extremity muscle function. Overall, the results of the present study indicate that Forward Head Posture is highly prevalent among young adults with prolonged screen

exposure and is significantly associated with reduced Hand Grip Strength. These findings highlight the importance of maintaining appropriate posture, adopting ergonomic practices, and increasing awareness regarding healthy screen-use habits to reduce the risk of postural dysfunction and associated musculoskeletal problems.

5. DISCUSSION

5.1 Demographic Characteristics of the Participants

The present study included 150 young adults aged between 18 and 40 years with prolonged screen exposure. Participants were recruited from schools, corporate offices, and community settings, representing individuals who routinely use digital devices for educational and occupational purposes. The demographic characteristics of the participants were appropriate for investigating the association between Forward Head Posture and Hand Grip Strength, as prolonged screen exposure is highly prevalent in this age group.

5.2 Prevalence and Severity of Forward Head Posture

The findings of the present study demonstrated a high prevalence of Forward Head Posture among young adults with prolonged screen exposure. Moderate Forward Head Posture was the most commonly observed category, followed by mild and severe Forward Head Posture. These findings suggest that prolonged use of smartphones, laptops, and other digital devices contributes to altered cervical posture. Sustained neck flexion, poor sitting posture, and inadequate ergonomic practices may increase the mechanical load on the cervical spine, resulting in postural deviations and musculoskeletal imbalance.

5.3 Association Between Forward Head Posture and Hand Grip Strength

One of the major findings of the present study was the statistically significant negative association between Forward Head Posture and Hand Grip Strength. Participants with greater severity of Forward Head Posture demonstrated lower Hand Grip Strength compared to those with mild postural deviation. This relationship suggests that abnormal cervical posture may influence upper limb muscle performance

through altered neuromuscular control, muscular imbalance, and reduced scapular stability. The findings support the concept that cervical posture plays an important role in maintaining optimal upper extremity function.

5.4 Impact of Prolonged Screen Exposure

The present study also demonstrated that prolonged daily screen exposure was associated with a higher prevalence of Forward Head Posture and reduced Hand Grip Strength. Most participants reported prolonged use of smartphones and laptops, often accompanied by slouched sitting posture and sustained neck flexion. Such postural habits may increase stress on the cervical spine and surrounding musculature, leading to neck pain, muscular fatigue, and impaired functional performance. These findings emphasize the need for ergonomic awareness and healthy screen-use practices among young adults.

5.5 Musculoskeletal Symptoms Associated with Forward Head Posture

Participants with moderate and severe Forward Head Posture frequently reported symptoms such as neck pain, neck stiffness, shoulder discomfort, headache, fatigue during work, and hand weakness. These symptoms may result from prolonged static loading of the cervical muscles and altered postural alignment during prolonged screen use. The findings indicate that Forward Head Posture affects not only cervical posture but also overall musculoskeletal health and daily functional activities.

5.6 Clinical Significance

The findings of the present study have important implications for physiotherapy practice. Early identification of Forward Head Posture and reduced Hand Grip Strength may help physiotherapists recognize individuals at risk of developing musculoskeletal disorders related to prolonged screen exposure. Regular postural assessment, ergonomic education, and awareness regarding correct sitting posture and healthy screen-use habits may help prevent postural abnormalities and preserve upper extremity function.

5.7 Limitations of the Study

The present study has certain limitations.

Convenience sampling was used, which may limit the generalizability of the findings to the wider population. The cross-sectional design identifies only an association between Forward Head Posture and Hand Grip Strength and does not establish a cause-and-effect relationship. In addition, information regarding screen exposure and musculoskeletal symptoms was obtained through self-reported questionnaires, which may be influenced by recall bias. Future studies involving larger sample sizes and longitudinal designs are recommended to further validate these findings.

5.8 Overall Discussion

Overall, the present study demonstrated that Forward Head Posture is highly prevalent among young adults with prolonged screen exposure and is significantly associated with reduced Hand Grip Strength. Individuals with greater postural deviation exhibited lower grip strength and reported more musculoskeletal symptoms. These findings highlight the importance of maintaining proper posture, adopting ergonomic practices, and increasing awareness regarding healthy screen-use habits to reduce the growing burden of screen-related musculoskeletal disorders and improve functional health among young adults.

6. CONCLUSION

The present study was conducted to investigate the association between **Forward Head Posture (FHP)** and **Hand Grip Strength (HGS)** among young adults with prolonged screen exposure. The findings demonstrated a high prevalence of Forward Head Posture in the study population, indicating that prolonged use of digital devices and poor postural habits are common among young adults. A statistically significant negative association was observed between the severity of Forward Head Posture and Hand Grip Strength, suggesting that individuals with greater postural deviation exhibited lower upper extremity muscle strength.

The study also found that participants with prolonged screen exposure commonly experienced musculoskeletal symptoms such as neck pain, neck stiffness, shoulder



discomfort, headache, fatigue during work, and hand weakness. These findings indicate that prolonged screen exposure not only affects cervical posture but may also influence upper extremity function and overall musculoskeletal health.

The results emphasize the importance of early postural assessment, ergonomic awareness, and regular monitoring of young adults who are exposed to digital devices for extended periods. Physiotherapists can play an important role in identifying Forward Head Posture at an early stage and educating individuals about proper posture, ergonomic modifications, and healthy screen-use habits to minimize the risk of developing musculoskeletal disorders.

In conclusion, the present study established that **Forward Head Posture is highly prevalent among young adults with prolonged screen exposure and is significantly associated with reduced Hand Grip Strength.** These findings highlight the need for preventive strategies, increased awareness, and early intervention to promote optimal postural alignment, preserve upper extremity function, and improve the overall musculoskeletal health of young adults in the digital era.

7. CLINICAL IMPLICATIONS

The findings of the present study have important implications for physiotherapy practice, as they highlight the increasing prevalence of Forward Head Posture (FHP) among young adults with prolonged screen exposure and its association with reduced Hand Grip Strength (HGS). Early identification of postural abnormalities through simple clinical assessment methods such as the Postural Observation Method and the Head-to-Wall Distance Test can help physiotherapists recognize individuals at risk of developing musculoskeletal dysfunctions before they progress to chronic conditions.

The significant association between Forward Head Posture and Hand Grip Strength suggests that assessment of cervical posture should be considered an essential component of routine physiotherapy evaluation for individuals who use digital devices for prolonged periods. Similarly, Hand Grip Strength assessment can serve as a simple, reliable, and cost-effective indicator of upper extremity muscle function and may assist clinicians in identifying functional impairments associated with poor posture.

The results also emphasize the importance of ergonomic education and postural awareness programs in schools, colleges, workplaces, and corporate offices where prolonged screen exposure is common. Educating young adults regarding correct sitting posture, appropriate workstation ergonomics, regular movement breaks, and stretching exercises may help reduce the development of Forward Head Posture and associated musculoskeletal symptoms.

Furthermore, the study highlights the need for preventive physiotherapy strategies focusing on posture correction, cervical muscle strengthening, flexibility exercises, and ergonomic modifications. Early intervention may help improve postural alignment, maintain upper extremity function, reduce musculoskeletal discomfort, and enhance overall quality of life among young adults. The findings may also assist healthcare professionals, educators, and employers in designing effective workplace and educational wellness programs aimed at promoting healthy screen-use habits and preventing screen-related musculoskeletal disorders.

8. REFERENCES

- Kendall FP, McCreary EK, Provance PG, Rodgers MM, Romani WA. *Muscles: Testing and Function with Posture and Pain*. 5th ed. Baltimore: Lippincott Williams

& Wilkins; 2005.

- Neumann DA. *Kinesiology of the Musculoskeletal System: Foundations for Rehabilitation*. 3rd ed. St. Louis: Elsevier; 2017.
- Kisner C, Colby LA, Borstad J. *Therapeutic Exercise: Foundations and Techniques*. 8th ed. Philadelphia: F.A. Davis; 2023.
- Yip CH, Chiu TT, Poon AT. The relationship between head posture and severity and disability of patients with neck pain. *Man Ther*. 2008;13(2):148-54.
- Griegel-Morris P, Larson K, Mueller-Klaus K, Oatis CA. Incidence of common postural abnormalities in the cervical, shoulder, and thoracic regions and their association with pain in two age groups of healthy subjects. *Phys Ther*. 1992;72(6):425-31.
- Falla D, Jull G, Hodges PW. Patients with neck pain demonstrate reduced electromyographic activity of the deep cervical flexor muscles during the craniocervical flexion test. *Spine*. 2004;29(19):2108-14.
- Ruivo RM, Pezarat-Correia P, Carita AI. Cervical and shoulder postural assessment of adolescents between 15 and 17 years old and association with upper quadrant pain. *Braz J Phys Ther*. 2014;18(4):364-71.
- Szeto GPY, Straker LM, O'Sullivan PB. A comparison of symptomatic and asymptomatic office workers performing monotonous keyboard work. *Man Ther*. 2005;10(4):281-91.
- Singla D, Veqar Z. Association between forward head posture and neck pain: A systematic review. *Int J Ther Rehabil Res*. 2017;6(3):75-82.
- Kim MS. Influence of neck pain on cervical movement in subjects with forward head posture. *J Phys Ther Sci*. 2015;27(6):1739-42.
- Lee JH. Effects of forward head posture on static and dynamic balance control. *J Phys Ther Sci*. 2016;28(1):274-7.
- Alghadir AH, Iqbal ZA, Iqbal A. Effect of smartphone use on cervical posture and musculoskeletal disorders among young adults. *Healthcare*. 2023;11:1-12.
- Neupane S, Ali U, Mathew A. Text neck syndrome and its association with smartphone use among young adults: A cross-sectional study. *J Bodyw Mov Ther*. 2022;30:1-7.
- Lau KT, Cheung KY, Chan KB, Chan MHS, Lo KY, Chiu TTW. Relationships between sagittal postures of the cervical spine, muscle performance, and disability in people with chronic neck pain. *Man Ther*. 2010;15(5):457-62.
- Harrison DE, Harrison DD, Croft AC, Harrison SO, Troyanovich SJ. Sitting biomechanics part I: Review of the literature. *J Manipulative Physiol Ther*. 1999;22(9):594-609.