INTRODUCTION
The disability associated with dentistry is an increasingly serious, alarming problem. The nature of profession itself carries onerous and harmful effect on the body of the dentist, which cannot be overlooked. The strained posture put overstress in the spine region. The twisted spine can sustain the stress for small period of time, but gradually the chronicity of the disability sets in. The constant gnawing pain deteriorates the quality and quantity of the work and may later on become carrier ending disability. Therefore, early identification and intervention is deemed necessary. Studies has found that the mechanism leading to work related musculoskeletal pain are multifactorial. This pain can be attributed prolonged static postures; repetitive movements; suboptimal lighting; improperly designed and positioned operatory; genetic predisposition; mental stress; physical conditioning; and age. Besides, dental procedures are generally lengthy and require intense concentration. Article provide a brief review of spinal anatomy and the biomechanics of sitting postures along with highlighting pathophysiology and more importantly about prevention strategies both in and out of the operatory. Anatomy and Physiology: The human spine has 7 Cervical vertebrae (C), 12 Thoracic vertebrae (T), 5 Lumbar vertebrae (L), and 5 Sacral vertebrae (S). The spine helps us to stand straight, its shape is designed to carry the weight of the body and distribute it straight down through the pelvis. The intervertebral disc consists of tough and soft pads that separate the bones of the spine from one and another. The intervertebral discs make up one fourth of the spinal column's length.

Basically it has three functions:
1. It holds the vertebrae of the spine together by acting as ligament.
2. It acts as a shock absorber thereby carrying the downward weight of the body in an upright position.
3. It allows the spine to bend rotate and twist by acting as a pivot point.

Prevalence: The actual aetiology and diagnosis is often difficult to make but the prevalence of the problem requires preventive strategies to be followed by dentists. The result of the study conducted at University of California San Francisco School of dentistry has shown that 46 to 70% of students reported body pain with the percentage generally increasing with years in dental school. In 2003, a study has shown that 62% of dentists reported at least one musculoskeletal complaint, 30% chronic complaints, 16% had spells of absence and, 32% sought medical care. Another Polish study has reported that the majority of respondents reported painful disorders of more than one region of which the predominant is of the sacral region - 76.9%, cervical region - 66.6%, and the lumbar region - 56.4%. In 1989, Bassett concluded that...
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compression of the spine. Ratzon, had linked
musculoskeletal pain occurrence to the dentists’
frequent assumption of static postures which
requires more than 50% of the body's muscles to
contract to hold the body motionless while resisting
gravity. Routine and extended clinical work causes
prolonged static contractions of muscle groups (such as
the erector spine in the lumbar and cervical
areas) which actually result in diminished blood
flow into and out of an area due to the compression
and lack of dynamic movement. Reduced blood
flow and prolonged periods of compression often
lead to degeneration of muscle, skeletal, and nerve
tissue in the affected areas. The net result of these
injuries leads initially to an inflammatory response.
While the ultimate outcome of inflammation is to
replace or repair injured tissues with healthy, regenerared tissue, but when continued task
performance is superimposed upon injured and
inflamed tissue, a vicious cycle of injury, chronic or
systemic inflammation, fibrosis, and perhaps even
tissue breakdown may occur. Over the time, the
muscles responsible for rotating the body to one side
can become stronger and shorter, while the opposing
muscles become weaker and elongated. The stressed
shortened muscles can become ischemic and
painful, exerting asymmetrical forces on the spine
that can cause misalignment of the spinal column
and decreased range of motion in one direction over
the other. The muscle imbalance that tends to
develop between the abdominal and low back
muscles is especially problematic in seated-posture
dentistry. Repeatedly leaning toward a patient can
cause strain and overexertion in the low back
extensors, while the deep stabilizing abdominal
muscle (transversus abdominus) tends to become
weaker. Prevention: The practice of ergonomics
becomes the centre of focus in determining how best
to achieve success with patients without stress. 
Knowledge about the prophylaxis and the scope of
improvement should be practiced professionally in
routine clinical procedures. Prevention includes
early identification of symptoms, analysis of
working posture and activity, and the evaluation of
equipment (such as dental instruments, position of
the dental unit, patient and operator chairs, and
lighting). The ergonomic strategies are based on
identifying the best daily timetable (including
periodic pauses) and most efficient team
organization, as well as establishing the correct
position that should be held at the patient chair.
Finally specific therapeutic programs are very
important in preventing or treating work related
musculoskeletal disorders. In fact, fitness exercises
such as mobilization, stretching or muscular and
cardiovascular training are recognized as
fundamental for dental professionals, and when
work related musculo-skeletal disorder occurs,
physical therapy are recommended. Prevention
strategies can be followed in and out of operatory,
with suitable modification and minor alteration
without affecting the lifestyle. The key factors of
maintaining healthy spine revolves around four
concepts:
1. Strategic positioning of patient and dentist.
2. Design of the operatory

Strategic positioning of patient and dentist:
Adjust your chair first. A common mistake
operators make is positioning patients first and then
adjusting their chair to accommodate the patients. It is crucial for a dentist to be aware of how to adjust
the features of their chair to maintain the spine in
neutral position. Maintaining neutral low back
posture in dentistry is essential in the prevention of
low back pain. This means maintaining a slight
curve in the low back when seated or standing. To
achieve this dentist should have a comfortable snug
fit against the back of the chair. The back rest
should be adjusted to support the natural lumber
curve. The feet of the dentist should be flat on the
floor with knees and hips bent at right angle (Fig 4
and 5). Maintaining a neutral posture is required
only during the direct vision line to the oral cavity. Many opportunities exist during treatment to allow back and neck muscles to relax as you await anaesthesia, setting of materials, etc. According to Lehto and colleagues, the concept of a single correct work posture may be physiologically invalid, as the human body may be made for movement and ever changing postures. Alternating between standing and sitting also can be an effective tool in preventing injuries. One study revealed that dentists who worked solely in a seated position had more severe low back pain than did those who alternated between standing and sitting. 

**Design of the dental operatory:** Operatory design determines the frequency of detrimental twisting movement which dentist performs. During forward flexion and rotation - a twisting position often assume by the operator the pressure increases 400%, making the spine vulnerable to injury. Certain clinical equipment usage and positioning profile elements are associated with decreased risk of musculoskeletal symptoms for dentists:

- Operatory light positioned close to the clinician’s sight line for maxillary treatment
- Utilization of four-handed (assisted) delivery
- Use of surgical magnification loupes and microscopes.

Loupes used by 5% of dentists in the survey act to magnify objects allowing easier detection of things that are difficult to see. They also act to enhance the posture as the dentist can sit more upright. The operatory stool with the seat pan tilted forward 5 to 10 degrees opens the hip angle to about 110 degrees, while a saddle-style stool increases the angle to about 125 degrees. Using a saddle stool moves your pelvis toward its most neutral seated position (very close to a standing posture), which requires the least muscular effort to maintain the spinal curves (Fig. 6). One aspect of good operatory design positions the oral cavity, delivery unit, and all supporting surfaces at the same height above the finished floor. This height is typically 30 to 32 inches and height synchronization creates a working plane that minimizes leaning and tilting movements.

**Strengthening exercises and awareness:** Preventing musculoskeletal pain is the best approach to management. The exercise program should include a 5- to 10- minute warm-up, torso/core training, strength/resistance training, interval training, and recovery and post-exercise nutrition. Aerobic exercise has been reported to improve or prevent back pain.

1. An exercise promote strengthening of trunk muscle should be followed. In this exercise dentist has to lie on his back and raising the legs up to 45° from the floor, without bending the knees he should make circular movements of 30 cm diameter five times both clockwise and anticlockwise. (Fig. 7)

2. Here, dentist lies on his back while putting both hands behind back of the neck. Then he upright himself to the sitting position while maintaining the legs stable on the floor. (Fig. 8)

3. **Lumbar Stabilization Exercise With Swiss Ball** (Fig. 9)
   - Lie on stomach over ball.
   - "Walk" hands out in front of ball until ball is under legs. Reverse to starting position.
   - "Walk" hands out in front of ball until ball is under legs and slowly raise alternating arms over head.
   - "Walk" hands out in front of ball and slowly perform push-ups.

4. **Standing** (Fig. 10)
   - Stand with ball between your low back and wall.
   - Slowly bend knees 45° to 90°. Hold 5 seconds. Straighten knees.
   - Slowly bend knees 45° to 90° while raising both arms over head.

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**Figure 1:** Natural Curvature of spine

**Figure 2:** Curvature of spine

**Figure 3:** Incorrect posture

**Figure 4:** Correct posture

**Figure 5:** Incorrect posture

**Figure 6:** Saddle stool posture.
A systematic management for back pain among dental practitioners

Figure 7: Exercise 1  Figure 8: Exercise 2

Figure 9: Exercise 3  Figure 10: Exercise 4

Guidelines for Exercise: Certain guidelines should be observed when beginning any exercise program: consult a physician before beginning any exercise program; do not perform strengthening exercises for painful or fatigued muscles; begin exercise gradually, starting with the minimum number of repetitions; stop exercise immediately if numbness, tingling, dizziness or shortness of breath occurs; perform strengthening exercises three to four times per week and stretching exercises daily; always exercise in a pain-free range. The training ideally should start in the dental school itself, attempt has to be made to identify the students awareness of body position or work habits related to performance of dental procedures. Furthermore, the identification of factors that predict chronic disability may also shed light on, why some workers develop disability and thus guide the development of intervention strategies that may prevent this process from occurring.

CONCLUSION
The creeping and compounding nature of musculoskeletal disorder makes difficult for a dentist to ascertain the real etiology behind it. It is important to analyse and apply different sitting position suitable for a dentist. Along with this he should be aware proper operatory design and relaxation techniques.

REFERENCE