



## Physical Anthropology Section – 2003

### H41 An Evaluation of the Relationship Between Human Pelvic Size and Shape and the Distribution, Type, and Severity of Vertebral Degenerative Disease in Archaeological Material

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The goal of this presentation is to determine if there is association between pelvic size and shape and the distribution, type and severity of vertebral degenerative disease. The latter included osteophytosis, osteoarthritis, and intervertebral disc degeneration. Initial analysis of the data has confirmed current concepts regarding differences in size and shape of the female and male pelvic girdles. Evaluation of the effects of the pelvis on the site, severity, and distribution of vertebral degenerative disease are currently being undertaken and it is hoped that the results of this analysis will be presented.

In order to adopt an efficient bipedal posture and method of locomotion, the human skeleton has evolved a curved vertebral column and a stable, compact male pelvic girdle. The adaptive vertebral curves are most marked in the areas of C4-C6, T8-T10, and L3-L5 and the habitual force of gravity upon this configuration renders it susceptible to injury and degenerative disorders, such as osteophytosis, osteoarthritis, and intervertebral disc degeneration.

This research aimed to determine if there is any association between pelvic size and shape and the distribution, type, and severity of vertebral degenerative disease. As a compromise has been reached between efficient upright posture/bipedal locomotion and the size and shape of the female pelvis in relation to its role in parturition, a difference between the rates of degenerative disease was expected between the two sexes. Very little research to date has been conducted on the pelvic girdle and its relationship with other anthropological and palaeopathological parameters, so it is hoped that this study will help establish whether the actual size and shape of the pelvis alone bears any relation to the distribution of degenerative disease in the vertebral column.

A total of 103 documented individuals were examined from four British archaeological sites, spanning the 17th to the 19th century. The sites comprised, Christ Church, Spitalfields, London; St. Brides, Fleet Street, London; Kingston Quaker Burial Ground, Kingston Upon Thames, London; and St. Nicholas, Sevenoaks, Kent. The sex and age of these individuals is known from associated documented biographical data, and the sample represented a northwest European, middle class, population. The sample consisted of 62 females (aged 17-87 years, mean = 52.08, SD = 18.24) and 41 males (25-75 years, mean = 52.66, SD = 14.77).

Collected were 62 measurements from the pelvic girdle and its separate components were collected, together with an assessment of pelvic shape. A working system for recording the distribution and degree of severity of degenerative change in the vertebral column was established for 24 vertebrae (7 cervical, 12 thoracic, and 5 lumbar) in addition to the first sacral vertebra and occipital condyles. Recognized recording standards were adopted, and in the case of osteophytosis and osteoarthritis, included detailed assessment of osteophytes, extent of circumference affected by lipping, degree of surface porosity, extent of surface affected by porosity, degree of eburnation, and extent of surface affected by eburnation. These attributes were also ascribed, when present, to the costal facets in the case of the thoracic vertebrae.

Schmorl's nodes were described according to four parameters: their status, position, greatest depth, and shape. Aside from noting the presence or absence of a node, there exists no standardized method for recording these entities. A scheme for indicating the position of a node on the vertebral surface has been published in the literature and this approach was adopted for documentation of this parameter. Measurement of the greatest depth was achieved by employment of the depth measurer on the digital sliding calipers. New strategies were developed to allow status and shape of the node to be recorded.

Initial analysis of the data has confirmed current concepts regarding differences in size and shape of the female and male pelvic girdles. Age was found to have no significant effect upon the measurements recorded. Strong correlations have also been identified between certain individual measurements and reasons for this have been suggested. Evaluation of the effects of the pelvis on the site, severity and distribution of vertebral degenerative disease are currently being undertaken and it is hoped that the results of this analysis will be presented. Final results should enhance understanding of this particular pathological process and the factors responsible for its development, thus determining whether pelvic shape and size does play a role in its occurrence.

#### Bipedal Adaptation, Pelvic Shape, Pelvic Dimensions