

The Incidence and Age Distribution of Osteoarthritis in an Archaic American Indian Population

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This investigation deals with osteoarthritic conditions in one of a series of five prehistoric American Indian populations living under varying ecological conditions. It forms a sequel to a paper describing a Middle Mississippi series presented last year at the Anthropology session of the Indiana Academy of Science meetings.

Although the Archaic series from Modoc Rock Shelter is very limited in the number of adult individuals that exhibit osteoarthritic changes, it nevertheless furnishes an indication of the incidence of the disease covering a time span from 3325 to 2765 B.C.

The Modoc Rock Shelter is located south of St. Louis, in Randolph County, Illinois. About 12,000 B.C. the Midwestern climate became warmer and the great continental glacier started its last retreat. The edges of the Modoc Bluff were exposed when the torrents of the Mississippi River began to subside and the river shrank into a smaller bed. The hunters found that the overhanging bluff protected them from rain and snow, and family groups used the shelter until time for the next seasonal migration.

Dr. Winters (8) has written that the climate was much damper and cooler than it is now, when the peoples of the Archaic culture first appeared in this area. The climate gradually warmed until around 4,000 B.C. it was much warmer and drier than today and the great grasslands spread. The climate cooled again after 2,000 B.C. and by 1,000 B.C. had become similar to the present. The ecological setting was a woodland which supported a mixed hunting and gathering economy.

C₁₄ analysis has shown the total span of occupancy at the Shelter to be almost 10,000 years. Most of the skeletal material inspected came from the Medial Archaic zone.

No great mammal bones were found since these creatures had moved north or westward. The families which did not pursue them (1) had to learn to hunt deer, elk, racoon and opossum instead. From the river they obtained mussels, snails, turtles and fish. The women dug for wild tubers and collected edible greens. Milling and nutting stones indicate that wild seeds and nuts were also utilized (2). These foods may not have been abundant however since only a small number of these artifacts were found. Marshes and ponds must have attracted the hunters as bones of such migrant birds as the Canada Goose, Snow Goose, Mallard and other ducks were found. Ford (3) mentions that Modoc man had more and better tools but grew no crops.

Bearing in mind a question which followed last year's presentation, the writer has observed that these peoples of basically related populations consistently showed only slight involvement of cervical vertebrae with the main lipping and osteophytic deposition occurring in the lumbar region.

Studies by T. D. Stewart (6) recorded the distribution of arthritic lipping throughout the vertebral column in three racial groups: Eskimos, Pueblo Indians and Whites. He combined the two sexes and all adults over 40 to give groups of 177 Eskimos, 83 Pueblos and 104 Whites. The general pattern showed an increased amount of lipping from above downward in the cervical, thoracic, and lumbar regions. Variations in the amount of lipping in these three areas occurred in these racial groups. The Eskimos had little lipping anywhere but in the lumbar region. The Pueblos had a little more lipping in each area. The lower cervical region had maximum lipping in the Whites, with lumbar and thoracic locations following in this order. The mobility of these joints is determined by racial structural variations of the vertebral column. He concludes that this pattern of racial variations may also reflect differing cultural factors.

Roche (5) found a slightly higher incidence in whites than in Negroes, in older skeletons and in females. In older males however, the incidence equally or exceeded that of the females. His series of 419 vertebral columns of American whites and Negroes (20-99 years) was from the Terry Collection.

In modern whites lipping does not occur often under 30. When it does appear earlier indications of back injuries are also present (7).

Trauma is given as one of the most obvious of all causative agents by Hollander (4). He says, "the wear and tear of the environment leaves its mark on the individual. It might even be said that the process of receding youth is one of unrelenting discovery of areas damaged during the lifelong encounter with the environment."

Last year the same scale of assessment was used as that employed in this Modoc Rock Shelter material:

Stage I—is characterized by slight lipping at the superior and inferior margins of the bodies of the vertebrae, or other joints,

Stage II—exhibits a more pronounced degree of lipping,

Stage III—is characterized by extensive lipping often resembling a mushroom-like eversion,

Stage IV—exhibits bony spurs or bridges with an increased mushroom-like outgrowth,

Stage V—presents actual ankylosis or bony union between two or more vertebrae, or other bones.

Dr. Georg Neumann¹ made the age determinations of this skeletal material using such criteria as endocranial suture closure, dental attrition, epiphyseal union, and, when available, changes in the pubic bone.

The Modoc Rock Shelter specimens available came to a total of 26 individuals, 14 males and 12 females. The estimated ages ranged from pre-adults (under 21) to 72 years. One of the only two individuals not showing any arthritic involvement was a male, age 15. The two other youths showed slight lipping at the margin of the centrum of the

1. The guidance of Dr. Neumann of Indiana University in the work on these series is greatly appreciated by the author.

lumbar vertebrae and were classed as Stage I. The two under-age females were also in this stage of incipient osteoarthritis.

Of the rest of the male population, only one, age 28, was free of vertebral lipping. One in his mid-thirties had Stage II development. Five in the fourth decade had a distribution of four in Stage II, one in Stage IV. Actual vertebral ankylosis, Stage V, was represented by one 66 year old male and two judged to be 70 years of age.

Among the females, the older ones were aged at 65 years having Stage V, and a 72 year old in Stage III. The four specimens in the mid-forties showed a range of Stage II, III, and two in Stage IV (bony spurs). This was slightly more involvement than the male of comparable age. The sole representative of the third decade was a Stage II. Two females in the late twenties were Stage I and II. As mentioned previously, the only male in that range had no arthritic involvement at all.

The sparse sample for comparison shows that the women in the "middle age" range had more extensive osteoarthritic involvement than the males in this range. However, the most striking case of lumbosacral lordosis and ankylosis (Stage V) was in a male whose age was judged to be 70 from dental estimates, bone texture and cranial suture closure. The fact that one individual of the series of Medial Archaic people exhibits a case of extreme involvement in which practically the whole spinal column has ankylosed, indicates that the disease was as prevalent among these Indians in Archaic times as in historic Indian groups.

The writer feels that osteoarthritis of the vertebral column constitutes a prevalent concomitant of age. The incidence of osteophytic lipping would probably agree fairly closely with that found in other Archaic populations if our sample were statistically adequate.

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