

## Comparison of Osteoarthritis in Three Aboriginal Populations

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Three groups from geographically different environments have been studied for incidence and degree of osteoarthritis. One of them, the Modoc Rock Shelter people, an early Midwestern group (3325-2765 B.C.), was reported on last year (3). There were 26 skeletons used from that group. The data has been compared with that obtained from 54 Pre-Aleuts excavated by Ales Hrdlicka (9) on Umnak Island near the Harbor of Nikolski.<sup>1</sup> This group (3018  $\pm$  230 years ago, (10)) formed a breeding isolate because of the geography and foggy climate of the Aleutian Islands. The other material was from Point Barrow, Alaska and is known as the "Old Igloo" series (6, 12) and represents the Birnirk culture (5, 11), now dated as 531-815 A.D.

32 of these strange brown skeletons were suitable for this study. Animal skin coverings and freezing conditions caused a state of preservation approaching mummification. There was no mineralization and little bone decay but the bones are very brittle. The uniform cranial measurements indicate that this group also is outside the range of local variation. Hrdlicka considered it to have been a recent immigrant group (8) to the Pt. Barrow area.

One of the most interesting observations about the Modoc group was that four of the five teenagers showed signs of beginning osteoarthritis, a slight bony "lipping" on the anterior bodies of the vertebrae. In the Pre-Aleuts only one female of the four "teens" showed similar signs which were uniform throughout the cervical, thoracic and lumbar regions. In contrast, the Point Barrow people, with one exception did not have the disease until the fourth decade. It was then present to the same degree (Stages II and III) as in the other groups, showing an increasing osteophytic deposition eventually resembling a mushroom-like eversion. Photographs of advanced stages may be seen on page 61 of the 1962 Proceedings (2). Two females in the 41-50 year range showed a lesser degree of involvement; the men of this age spread did not have as advanced cases as did the Pre-Aleuts in the damper climate.

One Pre-Aleut male in the 20-30 age range had no signs of vertebral lipping but showed a sharpening edge along the articular facets of the joints of the long bones. This appears to be quite common in material studied by the author, including Mexican Indian remains. It reflects the wear and tear of action and weight bearing and shows the beginning of the degenerative process often before it appears in the anterior portion of the vertebral bodies. After the age of 30, all the subjects were

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arthritic, although not all in sufficient degree to have caused painful symptoms.

In all groups however the older males showed more advanced stages than the females of the same age. This appears to be characteristic as does the finding that, past 41 years of age, 100% of the subjects show different stages of the malady. In the Modocs and Pre-Aleuts this was true in the 31-40 age range.

A tabulation was made of the type of antero-posterior distribution of osteoarthritis in the vertebral columns of the Pre-Aleut group in cases where sufficient vertebrae were present in each area for purposes of comparison. The ages were arranged as young adult (20-30), adult (31-50) and senile (50+). The Pre-Aleut group showed that a more even involvement from cervical to lumbar vertebrae was four times more common than a more progressive type which jumped two or more stages between cervical, thoracic and lumbar vertebrae. Perhaps the Pre-Aleut way of life caused a more general use of the various regions of the body.

The contrast in diet of the northern groups and the Plains Indians is also considerable. Since the inhabitants of the Arctic Coastal Plain and the Aleutian Islands depended so heavily on the sea, their diet was unusually high in fat and protein and low in carbohydrate except during the long winters when it was possible to approach the starvation point.

Geographic location and climatic conditions appear to have little effect on incidence of osteoarthritis but may be factors in the extent of involvement for individuals (4). It has been shown by Hollander's (7) recent experiment that the physical factors of the environment have a definite and measurable effect on the symptoms of an arthritic. A drop in pressure plus a rise in humidity caused an exacerbation of symptoms in seven of the eight rheumatoid patients and in three of the four osteoarthritics.

A report has just been published (1) on the influence of genetic and environmental factors on the occurrence of rheumatoid arthritis in the Blackfoot Indians of northern Montana and the Pima of southern Arizona. It did not yield statistically significant results however. Apparently, genetic and dietary differences need to be studied more thoroughly.

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