

Effect of habitual knuckle cracking on hand function

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Abstract

The relation of habitual knuckle cracking to osteoarthritis with functional impairment of the hand has long been considered an old wives' tale without experimental support. The mechanical sequelae of knuckle cracking have been shown to produce the rapid release of energy in the form of sudden vibratory energy, much like the forces responsible for the destruction of hydraulic blades and ship propellers. To investigate the relation of habitual knuckle cracking to hand function 300 consecutive patients aged 45 years or above and without evidence of neuromuscular, inflammatory, or malignant disease were evaluated for the presence of habitual knuckle cracking and hand arthritis/dysfunction. The age and sex distribution of the patients (74 habitual knuckle crackers, 226 non-knuckle crackers) was similar. There was no increased preponderance of arthritis of the hand in either group; however, habitual knuckle crackers were more likely to have hand swelling and lower grip strength. Habitual knuckle cracking was associated with manual labour, biting of the nails, smoking, and drinking alcohol. It is concluded that habitual knuckle cracking results in functional hand impairment.

Our hands allow us to fine-tune both our appreciation and manipulation of our environment. Loss or impairment of the articular, periarticular, sensory, or motor component may seriously compromise our functional capacity.

A variety of habitual behaviour is known to affect health adversely. Knuckle cracking is not an uncommon habit. Cracking of the knuckles results in a rapid increase of intrasynovial tension. This increased tension results in synovial fluid cavitation, which causes rapid separation of the joint and collapse of the vapour phase of the formed cavity. The consequent release of vibratory energy provides the cracking noise. This sudden release of vibratory energy submits the joint to high impact stresses. It is this type of phenomenon which is responsible for the erosion of ship propellers and blades of hydraulic machinery and bearings. Therefore, knuckle cracking might provide similar damage to the human joint.

The purpose of this study was to determine if habitual knuckle cracking leads to a decrement in hand function.

Patients and methods

Three hundred consecutive patients aged 45

years or more with no evidence of neuromuscular, systemic inflammatory, or malignant disease presenting to the medical clinic of Mount Carmel Mercy Hospital, and maintaining a clear recollection of whether or not knuckle cracking was part of their past history were evaluated by history and physical examination for evidence of hand dysfunction and osteoarthritis.

Recorded for analysis were age, sex, occupation, income level, drug treatments, grip strength, smoking history, alcohol intake, knuckle cracking and its duration, nail biting history, history of gout, osteoarthritis, carpal tunnel syndrome, hand trauma or surgery, the presence of Heberden's/Bouchard's nodes, skin rash, hand swelling, hand contractures, generalised osteoarthritis, and neuropathy, as well as a family history for these problems.

All data were recorded and evaluated by the Kruskal-Wallis one way analysis of variance, the Mann-Whitney U test, the Kendall and Spearman rank tests, Friedman's two way analysis of variance, and Kendall's coefficient of concordance.

Results

Of the 300 consecutive patients meeting the study criteria, 74 admitted to habitual cracking for 18 to 60 years (mean (SD) 35 (18)). Two hundred and twenty six patients denied habitual or occasional knuckle cracking. The age and sex distribution of both groups was similar, as was the prevalence of gout, generalised osteoarthritis, carpal tunnel syndrome, trauma or surgery to the hand, Heberden's or Bouchard's nodes, and hand contractures (table 1).

Significant differences between the two groups included hand swelling, which was seen more often in the habitual knuckle crackers (62/74, 84%) than in those not admitting to knuckle

Table 1: Patient details

Variable	Knuckle cracker		p Value
	Yes (n=74)	No (n=226)	
Mean (SD) ages (years)	63 (11)	63 (11)	NS*
Sex			
Male	21	65	
Female	53	161	
Personal history			
Gout	12	36	NS
Osteoarthritis	12	36	NS
Carpal tunnel syndrome	12	38	NS
Trauma/surgery	12	37	NS
Heberden's/Bouchard's nodes	12	37	NS
Hand contractures	6	18	NS

*NS implies $p > 0.05$.

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Table 2: Significant findings in the habitual knuckle crackers. Results shown as No (%) of patients except where indicated

Variable	Knuckle cracker		p Value
	Yes (n=74)	No (n=226)	
Hand swelling	62 (84)	13 (6)	<0.01
Grip strength (mmHg)*	210 (50)	280 (30)	<0.01
Manual labour	25 (34)	23 (10)	<0.05
Smoker	33 (45)	20 (9)	<0.01
Alcohol use	44 (59)	23 (10)	<0.01
Nail biting	30 (41)	34 (15)	<0.05

*Value given as mean (SD).

cracking (13/226, 6%) and grip strength, which was less for the habitual knuckle crackers (mean (SD) 210 (50) mmHg *v* 280 (30) mmHg; $p < 0.01$). Habitual knuckle crackers were more commonly manual labourers with higher incomes who more frequently smoked, drank alcohol, and bit their nails (table 2). The prevalence of these habits was greater in family members of the habitual knuckle crackers.

Discussion

The development of arthritis of the hand as a result of habitual knuckle cracking has been considered an old wives' tale. Swezey reviewed 28 nursing home patients who could recall whether or not they had cracked their knuckles. Among these patients, a relation between knuckle cracking and osteoarthritis could not be found.¹ Indeed, metacarpophalangeal osteophytes were found in patients who had not been habitual knuckle crackers.

Yet a bioengineering study of cracking joints suggested the potential for significant joint damage.² When tension is applied to the joint, cavitation occurs within the synovial fluid. This creates an unstable condition as the pressure within the bubble is lower than that of the surrounding fluid. Because the joint separation occurs at a high rate the net flow of synovial

fluid is towards the low pressure regions, with a collapse of the vapour phase of the cavity. There is a release of vibratory energy, which may be responsible for the cracking sound.

It is this phenomenon which is responsible for the erosion of ship propellers and the blades of hydraulic turbines.²

Given the potential damage caused by this cavitation phenomenon, one might expect habitual knuckle cracking to cause some decrement in hand function, if not accelerate the onset of osteoarthritis of the hand.

Of the 300 patients studied, 74 admitted to habitual knuckle cracking for 35 (18) years. Their sex distribution was similar to that of those denying knuckle cracking. Those patients who were habitual knuckle crackers were more likely to have swelling of the hand and lower grip strength (table 2). Other factors which might influence hand function, such as carpal tunnel syndrome, contractures, surgery or trauma to the hand, and the presence of Heberden's or Bouchard's nodes, were equally present in both patient groups. Habitual knuckle crackers, however, were more likely to be manual labourers with higher incomes (tables 1 and 2).

Although the cause of habitual knuckle cracking was not considered in this study, patients admitting to it were more likely to bite their nails, smoke, and drink alcohol, as were members of their families (table 2).³

This study suggests that although habitual knuckle cracking does not relate to osteoarthritis of the hand, it may relate to decreased hand function. Therefore, habitual knuckle cracking should be discouraged.

1 Unsworth A, Dowson D, Wright V. "Cracking joints". A bioengineering study of cavitation in the metacarpophalangeal joint. *Ann Rheum Dis* 1971; 30: 348-58.

2 Swezey R L, Swezey S E. The consequences of habitual knuckle cracking. *West J Med* 1975; 122: 377-9.

3 Kellgren J H, Lawrence J S, Bier F S. Genetic factors in generalized osteoarthritis. *Ann Rheum Dis* 1963; 22: 237-55.