OCCUPATIONAL HAND-ARM VIBRATION RESEARCH IN THE UNITED STATES

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ABSTRACT

Occupational hand-arm vibration research in the United States is briefly reviewed. An estimate of the number of exposed workers in the United States is given as well as an appeal for increased occupational hand-arm vibration research effort in the United States.

As early as 1915, studies of Raynaud's phenomenon in the United States were reported among stone cutters[1,2] using vibrating hand tools. These workers were studied by Alice Hamilton,[3] Rothstein,[4] Edsall,[5] and Leake[6] and were reported in 1918 or before. Very few studies in the United States were reported, then, until 1946 when Dart[7] described the effects of vibrating hand tools on 112 workers in the aircraft industry. He noticed these workers complained of pain, swelling, and increased vascular tone in the hands as well as tenosynovitis. Once again, there was a hiatus of occupational studies in this area in the United States until the early 1960's when Ashe et al.[8] and Ashe and Williams[9] reported that Raynaud's phenomenon had been clinically diagnosed on seven hard-rock miners. Surprisingly, however, Pecora[10] conducted a survey in the United States and concluded: "A preliminary survey of the literature on the incidence of Raynaud's phenomenon of occupational origin in this country revealed a conspicuous lack of information concerning both the number of workers affected and the number using small hand-held vibratory tools. An attempt was made to estimate the number of workers using vibrating tools and the number afflicted with Raynaud's phenomenon of occupational origin. All of the information thus gathered indicates that Raynaud's phenomenon of occupational origin may not be completely evaluated, but it may have become an uncommon occupational disease approaching extinction in this country."

Once again, there was a lack of occupational hand-arm vibration studies in the United States until 1974 when our NIOSH vibration group reported that there was an estimated 8 million workers exposed to occupational vibration in U. S. industries,[11] of which some 6.8 million were exposed to whole-body vibration and some 1.2 million to hand-arm vibration. These estimates were based on a 40-plant survey from the multiplicity of U. S. industries. Also, in 1974, the late Dr. Norman Williams (who had collaborated with Ashe in the early 1960's) and Byrne completed a study for NIOSH.[12] This study was an attempt to determine the quality, quantity, and availability of suitable health records (from which we might later conduct extensive epidemiological studies) in an attempt to actually identify and quantitate the extent of the occupational hand-arm vibration problem. Although this study was not totally exhaustive, the results indicate that of the sparse, suitable records available for an epidemiological study in the United States, the records of those companies employing workers who almost exclusively use hand tools are the best. Particularly disturbing, however, were his reports of informal talks with some workers whose hands appeared blanched. Many of these workers told him that they knew they had Raynaud's phenomenon, but lived with it and tolerated it because they feared loss of employment should they report the malady.

In view of the Williams report, our own observations, and the fact that the same types of vibrating hand-tools are used similarly and extensively throughout the world, we find it inconceivable to conclude that Raynaud's phenomenon of occupational origin (associated with hand-arm vibration) is extinct in the United States. We can only await the results of our planned epidemiological and other field studies to confirm the existence and the extent of this problem in the United States.

Despite the fact that some of the first occupational medical studies of hand-arm vibration were conducted in the United States some 60 years ago, research in the United States has fallen far behind that of other nations. We, at NIOSH, would like to help fill some of this void. The U. S. foundry study conducted by Dr. Leonida is particularly encouraging, and we hope other studies will follow. The development of medical, biological, modeling, and engineering monitoring techniques, as evidenced by the works of Drs. Rey-

nolds, Suggs, Nerem, Zweifler, Tichauer, and Agarwal presented at this conference, is indicative not only of the potential of the U. S. contribution to the international effort in this field, but also of their foresight in recognizing that this indeed must be a sizable problem area.

Finally, I would hope that this meeting will serve as a catalyst for additional epidemiological, biological, medical, and engineering studies here in the United States and elsewhere, the aim of which is the protection of the worker.

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