

PREVALENCE OF SYMPTOMS AND SIGNS OF JOINT IMPAIRMENT AT AGE 79

Gunilla Bergström,¹ Anders Bjelle,² Leif B. Sorensen,³ Valter Sundh¹ and Alvar Svanborg¹

From the ¹Department of Geriatric and Long-Term Care Medicine, ²Department of Rheumatology, University of Göteborg and ³Department of Medicine, University of Chicago, Chicago, USA; and the Gerontological and Geriatric Population study in Göteborg, Sweden. Project group: A. Svanborg, (project leader), S. Landahl and H. Djurfeldt

ABSTRACT. The prevalence of back and joint impairments was studied in a representative subsample of 77 women and 57 men aged 79. Forty-six per cent of the subjects had no history of back or joint complaints. Thirty-two per cent reported current back pains while 50% stated they never experienced such pains. Back pains (past or present) were localized in the lumbar region predominantly (40%), and were almost constantly present in 8% of the subjects. The spinal mobility remained acceptable for function of the activities of daily living (ADL) in the majority of the subjects. Thirty-six per cent of the subjects had past or present complaints from the joints of the extremities, predominantly of the knee, shoulder or hip joints. Physical signs of joint disorders as deformities, swelling or tenderness were rare except for enlargement of distal interphalangeal joints (right hand: females 38%, males 14%). Restricted range of motion (ROM) in one or several joints was found in one fifth (i.e., knee joints) to two thirds (i.e., hip joints). No significant gender differences were observed with the exception of the thoracolumbar ROM that was more frequently restricted in males. Severe restriction of separate movements (to less than 50% of ROM) was, generally, infrequent (0-8% of the subjects) although advanced impairment of hip inward rotation was found in 14% of the subjects. Restricted ROM associated with joint complaints was found in 2-11% of the subjects (i.e., knee joints 2%, shoulder joints 9%, hip joints 11%). A considerable proportion of 79-year-olds, thus, had some—though usually limited—restriction of joint ROM.

Key words: Ageing, population study, joint function, rheumatic symptoms

Musculoskeletal impairment is a major health problem in populations (12, 23). The prevalence of joint disorders has been considered to increase with age (18) although detailed information at ages above 70 is sparse. Several previous studies have investigated functional ability in the elderly, and, thus, have also included consequences of joint impairment and disability (7, 8, 18, 21, 37). Few have, however, concerned samples apparently representative of a general population, and been directed towards joint function and the prevalence of joint impairment (5, 24-27, 35). Most studies of joint disorders and func-

tion concerned either individuals seeking medical care because of symptoms, hospital patient groups (for a review, see 12), or are focused on younger individuals (14, 31).

The aims of the longitudinal study of representative samples of 70-year-olds in Göteborg, Sweden, (30, 36) were to investigate functional ageing as well as the incidence and prevalence of common geriatric pathologies. The first sample of 70-year-olds has now been followed to age 83. Age 79 was chosen for an extensive study of joint function due to the general opinion that functional impairment becomes rather common at about age 80 (24-26). Thus, the present report addresses joint impairment in the survivors of the 70-year-old group at age 79, and is the first report in a series of 3 describing impairment, disability, handicap and joint disorders at age 79 (9, 10).

SUBJECTS

Of the 973 70-year-olds (449 men and 524 women) originally investigated in 1971/72, 744 were re-examined in 1976/77, and 537 (209 men and 328 women) were examined again at the age of 79 in 1980/81. The sampling method, design and procedure of the general study has been previously described (30).

Certain examinations of back and peripheral joints were included in all the investigations (30). A more detailed study of joint function and disorders was made at the second follow up in systematically selected subsamples of 79-year-old survivors. The subsamples did not differ from the sample regarding marital status, physical activity, general state of health (absence of signs of definable disease (22)), and frequency of back or joint complaints. Thus, 134 persons (77 women and 57 men) were interviewed regarding back and joint symptoms, although data concerning back complaints was obtained from only 127 and concerning joint complaints from 129 probands. Ninety-nine probands underwent physical examinations that included range of joint motion ($n=89$) and/or a radiographic investigation of hands, wrists and knees that included soft tissue radiographs ($n=81$). The detailed joint examination was made

at a second visit which resulted in 7 probands not participating in the interview and 10 of the 99 invited not attending the physical joint examination.

METHODS

Interview

The probands were asked two introductory questions: "Have you presently or have you had back problems?" ("Brukar Ni ha ont i ryggen?") and "Have you presently or have you had any problems with your joints, e.g. pain, stiffness or swelling?" ("Brukar Ni ha ledbesvär, t.ex. värk, stelhet och/eller svullnad?"). If the answer was "yes" to either of the two questions, more detailed questionnaires—specific for each joint or group of joints—followed.

The present report is mainly restricted to results obtained in the subsamples. However, interobserver variation studies revealed that the answers to more general questions about joint function and state of health, which were asked by the other investigators and thus covered the entire sample of 79-year-olds, yielded no significant differences between the subsamples regarding joint and back symptoms and disorders.

Examination of joints

The probands were examined at the out-patient department of Vasa Hospital with the exception of seven examined in private homes and four examined in nursing homes. The range of motion (ROM) of vertebral column and peripheral joints was measured with a two arm plastic clinical goniometer and recorded according to Beetham et al. (6) and the American Academy of Orthopedic Surgeons (2). The ROM was thus measured in degrees but registered as angle sectors of ROM, as exemplified in Fig. 2-4. Restricted ROM was defined as ROM below average values for maximal ROM observed in younger adults (2, 6).

Vertebral column

The distance between the occiput and the wall was measured while the proband stood with his back against a wall. Examinations of the spine and the sacroiliac joints and the femoral nerve stretch test were performed with the proband lying prone; Lasègue's sign in the supine position. Chest expansion was determined as the mean difference in thoracic width, measured at mammillary level (in females at the level of third intercostal space), over 3 deep breaths.

Spinal ROM included cervical extension, forward and lateral flexion and rotation, and lateral flexion, rotation and dorsal extension of the thoracolumbar spine. Rotation of thoracic spine was defined as the maximal number of degrees the trans-axillary plane could be rotated while the proband was sitting in a chair with arms flexed across the chest, head maintained straight forward, and pelvis stabilized by rotating the feet medially. Finally, the lengthening of the vertebral column on bending forward (distance C₇-S₁, Schober's index (34), distance finger tips—floor) was measured.

Peripheral joints

The shoulders, including acromioclavicular joints, were examined for deformities, swellings and tenderness. Active

ROM regarding abduction, elevation and internal rotation was also registered. When limited, passive ROM was examined (elevation, abduction, dorsal extension and internal/external rotation). The elbows were inspected and palpated for signs of olecranon bursitis or epicondylitis. Extension of elbows and pronation/supination of wrists were registered. The wrists were examined for ganglions and signs of carpal tunnel syndrom. Dorsal, volar, radial and ulnar flexion were measured. The hands were inspected and palpated for swellings, atrophy or deformities such as rheumatic deformities, enlargements of interphalangeal joints, Dupuytren's contracture (permanent flexion contracture of metacarpophalangeal joint(s)) or palmar fasciitis (nodules or fibrous ties). Finger ROM was registered as ability of making a fist and subsequent extension of all fingers.

The position of iliac spines while standing and gait were registered. When limping, leg length was measured. Signs of tenderness of the hip region upon pressure or percussing the plantar side of heels were noted. Hip ROM was screened by a heel to knee test. Passive ROM in flexion, external and internal rotation, abduction, adduction and extension were registered as well as Thomas' test for possible flexion contracture. Knee joints were examined for deformities, swellings and crepitations. Knee flexion and extension as well as signs of laxity of capsular ligaments were registered. The ankles and feet were examined for deformities such as obviously lowered foot arches, hallux valgus and hammer toes. Dorsiflexion, plantar flexion, inversion and eversion of ankles were recorded.

Statistics

Student's *t*-test and the χ^2 -test were used together with two non-parametric tests—the Pitman test (15) and the Fisher two-tailed test (29).

RESULTS

In the interview group, 13% reported complaints of the back and joints, 40% from either back or joints, while 47% had no rheumatic complaints (45% of the females and 49% of the males) (Fig. 1).

A group consisting of 22% of the 79-year-olds (25% among females and 18% among males) were lacking signs and symptoms of previously defined diseases (22). This group displayed a tendency towards better joint function, but the only significant difference ($p < 0.01$) between them and those with signs of disease was superior ROM of thoracolumbar spine. When the "healthy" group was further reduced by removal of probands with possible impairment caused by fractures during the past 4 years or a history of specific arthritis (other than osteoarthritis), the remaining 12% of the subsample had significantly less restriction of knee motion ($p < 0.05$).

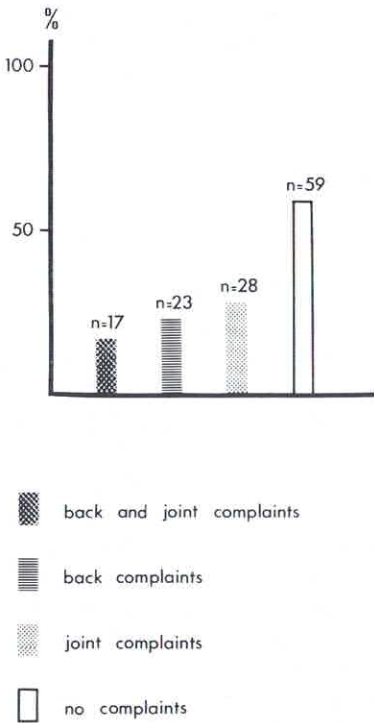


Fig. 1. Prevalence of complaints from back and/or peripheral joints (previous and present).

Back disorders

Interview

Approximately 1/3 of the interviewed subsample reported back disorders at the time of investigation and constant pain was reported by 8% (Table I). Sixteen probands (13%) reported previous back injuries, but 6 of them did not believe the injury had any connection to later back complaints. Other characteristics of reported back complaints, i.e., localization of back pains, are given in Table I. There was a strong predominance of lumbar pain as the only symptom or in combination with some other localized pain (8 probands had thoracic and lumbar pain). In 11 subjects (9%), pains radiated down the dorsal aspect of the lower extremity.

Physical examination

In the test of occiput to wall distance, approximately 50% of the individuals could reach the wall with the back of their head (Table II). Only 2.5% of the subjects stretched 12 cm and 24% stretched 5 cm, respectively, during the two vertebral column lengthening tests. These values were considered av-

erage limits for young individuals (2). Other findings concerning the vertebral column, e.g. ROM, are given in Table III. Among the 23 probands of the 89 physically examined who complained of current back disorders, 2/7 had restricted spinal extension ($<30^\circ$) and 1/3 had limited range of lateral flexion ($<35^\circ$).

Chest expansion during maximum inspiration revealed that 23% of the probands could not achieve the reference value of ≥ 5 cm for younger individuals (Table II). Ability to rotate the thorax was diminished in 4–9%. Regarding the cervical spine mobility, flexion was impaired ($<45^\circ$) in 7%, extension ($<50^\circ$) in 13% and lateral flexion ($<40^\circ$) in almost 37%, whereas rotation was impaired ($<60^\circ$) in 9%.

Peripheral joints

Interview

Table IV shows the prevalence of joint complaints and the localization of symptoms reported by 55 probands. When all peripheral joints were considered together, approximately 36% of the subjects

Table I. Back pains

	Women <i>n</i> =74 (%)	Men <i>n</i> =53 (%)	Total <i>n</i> =127 (%)
Prevalence of back pains			
None	50	49	50
Previous	16	22	19
Present	34	28	32
Localization of pains (previous and present)			
Cervical spine	10	9	9
Thoracic spine	10	6	8
Lumbar spine	41	40	40
Type of pains (previous and present)			
Constant	8	8	8
Intermittent	33	28	31
Only when lifting	10	25	16
No pain at rest	19	15	18
Relief with analgesics	27	26	26
Proband opinion for cause or previous and present back pains			
Unknown	18	11	15
Previous accident	8	6	7
Infection	3	–	2
Rheumatoid arthritis	3	–	2
Heavy loading (due to strenuous physical professional work)	4	19	10
Oblique loading	5	–	3
Other cause	4	10	6

Table II. Some measurements of the function of vertebral column and chest

	n	Sex	M±SD (cm)	Ref. value younger ind. (cm)
Distance C ₇ -S ₁	44	F	4.9±2.1	≥12
on bending forwards	36	M	5.8±2.6	
Schober's index	44	F	3.5±1.0	≥5
	36	M	4.4±1.4	
Distance occiput to wall	45	F	1.7±2.6	0
	34	M	2.4±3.1	
Chest expansion	46	F	3.3±1.0	≥5
	35	M	4.2±1.4	

reported impairment predominantly in the knee, shoulder and hip joints (17–12%). Impairments of hand or finger joints were much less common (7%). Nineteen of the 55 probands with joint problems (36%) reported having “articular gelling”, a temporary feeling of stiffness after having rested and 10 (20%) reported that exercising their joints would diminish the stiffness. Twenty-six subjects (47% of those with joint problems) suffered from pains when moving and/or stressing their joints. Eighteen (33%) had no articular pain while resting, 10 (18%) were partly relieved and 6 (11%) had persistent pain when resting. Ten (19%) were awakened by nightly pains.

Physical examination

Acromioclavicular joint. None of the males had any tenderness while 2 out of 52 women reported pain in the right joint and 3 in the left upon palpation and motion.

Shoulder. Rotator cuff tenderness on palpation was noted in the dorsal aspect by 6%, in the anterior aspect by 10% and in the upper part of the right shoulder by 12% of the females and by 0, 0 and 8%, respectively, of the males. Almost identical figures were noted for the left shoulder.

ROM of right shoulder is shown in Fig. 2. Six probands (7%) had impaired abduction ability indicating previous rupture of the supraspinatus tendon. Sixty-one per cent had no restriction of ROM of any shoulder. Although active internal rotation was decreased in nearly 1/3 of the individuals, passive internal rotation was restricted in only 16%. Thus, if those with restricted active but unrestricted passive internal rotation were added to the group of subjects

with unlimited active ROM, the proportion of probands with no restriction of ROM of both shoulders would rise to 69%.

Elbows. Ten probands (11%) had developed a flexion contracture of the right elbow >5° and 6 individuals (7%) had bilateral impairment. Pronation-supination of the right wrist was limited (<180°) in subjects (6%) while 4 subjects (5%) had a similar limitation of the left wrist.

Wrists (radiocarpal joints, carpus, palms). Tenderness, swellings or deformities were found in 7% of the subjects. Three women and one man had Dupuytren's contracture (5%), whereas 16 women (31%) and 11 men (30%) had palmar fasciitis in the right hand. In the left hand 3 women but no men had Dupuytren's contracture (3%). Palmar fasciitis was observed in 8 women (15%) and 9 men (24%), totalling 19% for the left hand. Thus, there were 10 probands (11%) with involvement of both hands, 17 (19%) with right-handed and 6 (7%) with left-handed disorders—33 subjects totally (37%).

ROM of the left wrist was almost identical to ROM of the right wrist. Forty-seven per cent of the probands had no wrist ROM restriction.

Metacarpophalangeal and interphalangeal joints (MCP, PIP and DIP). Ulnar deviation of the MCP-joints of the right hand was prevalent in 4 women and one man and, of left hand, in one woman. Few subjects (1–3%) had volar subluxation or swellings of MCP-joints. As shown in Table V, right sided impairments were observed more often than left, although the difference was not statistically significant.

Table III. Physical examination of back

	n=89 (%)
Distance finger tips—floor on forward bending, knees straight	
0–±10 cm	57
10–20 cm	17
>20 cm	26
Lasègue's sign pos.	14
Femoral nerve stretch test pos	6
Range of motion (ROM)	
Thoracolumbar spine	
Dorsal extension	<30° 60
Lateral flexion	<35° 33
Thoracic rotation	<30° 2
Cervical spine	
Flexion	<45° 7
Extension	<50° 13
Lateral flexion	<40° 37
Rotation	<60° 9

Table IV. Joint complaints

	Women n=75 (%)	Men n=54 (%)	Total n=129 (%)
Prevalence			
None	53	65	58
Previous	8	4	6
Present	39	32	36
Localization (previous and present)			
Finger	9	4	7
Wrist	8	2	5
Elbow	4	-	2
Shoulder	16	15	16
Hip	11	13	12
Knee	19	15	17
Ankle	4	2	3
Toe	-	-	-

cant. This was also true for the ability of making a fist (80% without motion restriction regarding the right and 89% regarding the left hand). Enlarged DIP joints were found in approximately 1/3 of the females but in only 1/7 of the males ($p < 0.05$). The ability of making fists and stretching the fingers in combination with the absence of pathological exami-

nation findings concerning MCP, PIP and DIP joints was found in 19 probands (21%). Furthermore, complete active ROM with the exception of only minor extension limitations in the DIP joints of the 5th finger was observed in 7 probands (8%) regarding the right hand and in 2 regarding the left hand.

Hip joints. Three of the 89 examined probands could not walk. Fifteen (17%) of the remaining 86 subjects had a limping gait (12 women and 3 men).

The range of hip motion, as determined by the heel to knee test, was limited in 11% of the men and 5% of the women (9% of the total) for each hip, respectively. Three probands could not perform the test because of advanced knee deformity.

Results concerning ROM of right hip are given in Fig. 3. Left hip data were nearly the same although the side difference was, as in most peripheral joints, not significant. Twelve persons were not examined for hip extension as they were not able to lie prone. Altogether, 33 probands (37%) were free from motion impairment in both hips. If the 27 individuals with slightly restricted abduction (ROM 30–40°) as the single finding are added to this group, the sum indicates fairly good articular mobility of the hips in 60 subjects (67%).

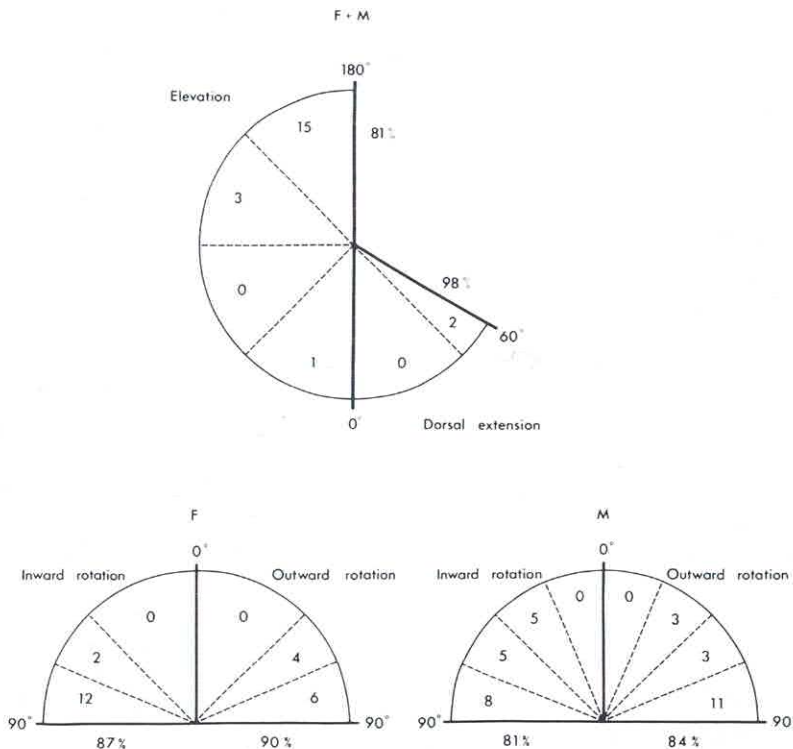


Fig. 2. Range of motion of right shoulder. Percentage of probands. Females (F) n=52, males (M) n=37.

Table V. Examination of finger joints (metacarpophalangeal (MCP), proximal (PIP) and distal interphalangeal (DIP) joints)

	F n=52 (%)	M n=37 (%)
Enlarged PIP-joints		
Right hand	17	8
Left hand	8	3
Enlarged DIP-joints		
Right hand	38	14
Left hand	29	8
Abnormal examination findings		
DIP+PIP, right hand	52	32
DIP+PIP, left hand	35	19
MCP, right hand	10	6
MCP, left hand	6	6

Knee joints. Upon inspection and palpation of both knees, no pathological signs nor significant side differences were observed in 70–80% of the individuals. ROM of the right knee is given in Fig. 4; few persons had impairments.

Ankle and mid-tarsal joints. Approximately 15% of the women and 10% of the men had abnormal

positioning of the right foot (e.g. valgus, or pes equinovarus).

The longitudinal foot arch was lowered in 8% of the probands. The transverse (metatarsal) arch was lowered in 59% regarding the right foot and in 55% regarding the left foot. Hallux valgus was found in the right foot of 54% and in the left foot of 50% of the women; corresponding figures for men were 43% and 38%, respectively. Hammer toes were observed in 25% of the women and in 18% of the men.

A decline of mobility to $\leq 50\%$ of the range of motion of the ankles mainly concerned eversion. Thus, 10% of the probands had rather stiff subtalar joints.

Complaints versus restricted range of motion (ROM). Among 23 subjects with current back symptoms 2/3 had restricted spinal extension and 1/3 had limited lateral flexion ability.

The prevalence of peripheral joint complaints and/or restricted ROM are given in Fig. 5. Generally, one half to two thirds of the subjects had neither complaints nor restricted ROM, with the exception of hip joints in which approximately 2/3 of the probands had impairments of varying degree. All persons with current hip complaints had re-

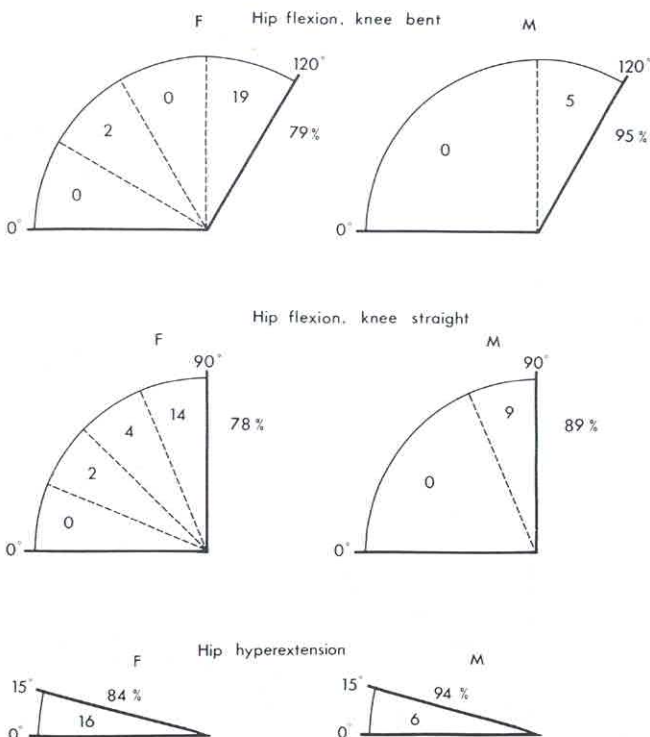


Fig. 3. Range of motion of right hip. Percentage of probands. Females (F) $n=52$, males (M) $n=37$.

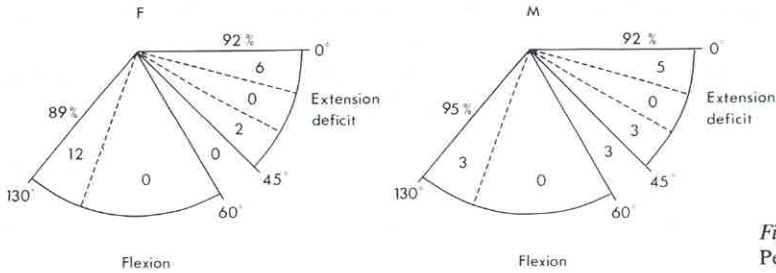


Fig. 4. Range of motion of right knee. Percentage of probands. n=89.

stricted ROM. Four probands had had a previous hip fracture (all right sided). Fifty-nine subjects (66%) had no knee joint complaints and had full active knee ROM, but 7 of these had instability of their knees. Eighteen probands complained of knee problems; 13 of these had bilateral knee complaints. No restriction of ROM was found in 10 of these.

Statistically significant differences were found between the group of probands with shoulder symptoms opposed to those without regarding muscular atrophy ($p<0.05$), tenderness upon palpation of the upper part of the right shoulder ($p<0.01$), all screening tests for active ROM ($p<0.05$), passive internal rotation of right shoulder ($p<0.01$) and forward elevation as well as abduction of left shoulder ($p<0.01$).

There were highly significant differences between the group with current hip complaints compared to

those without for practically all the separate movements examined. The most striking difference was found regarding the right hip internal rotation examination; 80% of those with symptoms had restricted ROM compared to 17% of those without symptoms ($p<0.001$).

Significant differences ($p<0.05$) were found concerning palpation findings (mostly crepitation) and signs of laxity of lateral collateral ligament of the left knee when the group of probands with knee symptoms was compared to those without.

When the 60% of the subjects who were physically active (implying daily walking up to at least 4 hours a week) were compared to those who were sedentary, the prior group suffered from back or joint complaints or restricted ROM of hip and knee joints half as often as the latter. Whether this was due to actual lack of training in the sedentary group, or if their limited motor activity was a natural consequence of articular pains, remains unresolved. It should be emphasized that no significant difference in the frequency of back or joint pains was found between those with former heavy professional work and those with a more sedentary profession, as defined in a previous report from our study (32). This

Current complaints and/or restricted ROM of peripheral joints n=89

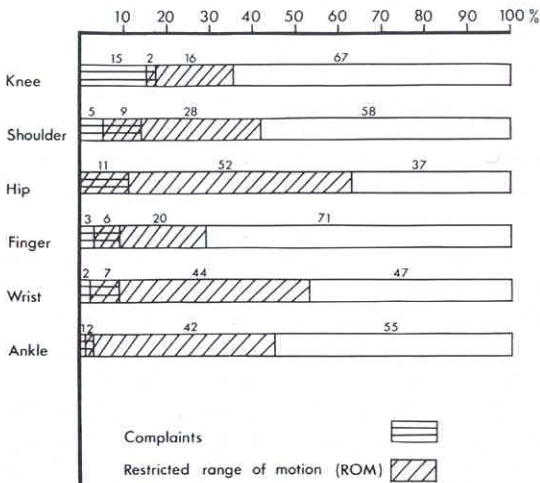


Fig. 5 Current complaints and/or restricted ROM of peripheral joints.

Table VI. Prevalence of restricted range of motion (ROM)

	F n=54 (%)	M n=37 (%)	Total n=89 (%)
Cervical spine	40	43	41
Thoracolumbar spine	63	84	72
Shoulders	31	46	37
Wrists	50	51	51
Fingers	31	19	26
Hips	67	57	63
Knees	21	11	17
Instability of knee joints	27	11	21

also concerned those whose professional work included much walking.

Body weight and body mass index (BMI) showed a statistically significant correlation to current knee pains in women but not in men. Women reported knee pains and displayed signs of knee disorders more frequently than men (Table VI). Some interesting numerical differences between gender groups were observed: restricted ROM of finger joints was more frequent among females (NS) while impaired shoulder (NS) and lumbar motion ($p < 0.05$) were more prevalent among males than females. Right sided restricted ROM or other pathological findings were not significantly more common than left sided.

DISCUSSION

The original sample of 70-year-olds born in 1901/02 was found to be, generally, representative of the total population of 70-year-olds in Göteborg (30). Further non-response at age 79 has not been found to influence that representativity, implying that the present results from the study at age 79 should allow a certain generalization to the total population of 79-year-olds. The fact that the subsample in whom joint disorders were specifically studied did not differ in the investigated parameters from the total sample of 79-year-olds further emphasizes the possibility to generalize from the present results, although the subsample size was limited.

Almost 50% of the women and men were still, at the age of 79, without complaints of back or joint impairments. In 18% of the reported joint complaints the subjects could not state any cause. In another 11% of the joint complaints, miscellaneous causes including "age-bound", "worn-out" and sequelae of congenital hip disorders were mentioned as causative factors. The complaints potentially indicate a diagnosis of osteoarthritis (OA). The problem of defining OA will be discussed in another report (10). Other joint disorders, mainly rheumatoid arthritis, were the cause of 71% of all reported joint complaints.

Schober's index (34) was used for the measurements of spinal flexibility due to its simplicity, although other more exact methods are available (16). The results allow the conclusion that both males and females had a restricted ability to bend forward when compared to reference values of younger adults (2). However, measurements of the distance

between the finger tips and the floor when bending forwards with straightened knees revealed that 70% of the females and 40% of the males reached within 10 cm of the floor; more than 20 cm from the floor was observed in 20% of females and 30% of males. Thus, the results could be interpreted as showing that acceptable back mobility was found in the majority of these elderly, and it was apparently greater in females than males.

Less than 10% of the subjects reported constant back pains but close to 1/3 of the elderly suffered from intermittent episodes of back complaints—as expected, predominantly low back pain. Back pains were present in 1/3 of the subjects at the time of investigation. The prevalence figure might be considered to be rather high but is considerably lower than the prevalence reported in an investigation of 69-year-olds in Stockholm (35). Other investigators (4, 20) have reported that the frequency of back disorders reaches a maximum at age 50, and then declines. The prevalence of back problems in the age interval 70–79 will be discussed in a separate report derived from a cross-sectional study of joint disorders within the present population study (11).

The effect of previous heavy work on back and joint complaints is difficult to assess (for a review, see Anderson (3)). Bjelle et al. (13) reported in a survey on health care utilization in Sweden that the number of male back pain patients declined at the standard retirement age. Roupe & Svanborg (32) found no differences in the prevalence of back complaints between 70-year-old males having had physically strenuous occupations and those having had sedentary work. The present finding of similar occurrence of back complaints in males and females might also indicate that heavy loading of the skeleton, as males are more often exposed to, is not the predominant cause of back complaints in later years of life, although the male probands usually referred back complaints to previous strenuous physical loading.

Measurements of skeleton density on the probands examined in this longitudinal study (17, 33) were performed by Dr Åke Rundgren and collaborators. The bone density of the calcaneus was not correlated to the occurrence of back or joint complaints among the 79-year-olds, although males with previous strenuous occupations had significantly higher skeletal density (Rundgren, personal communication, 1984). This might indicate that back pains in males may be induced by traumatic injuries

or osteoarthritis as an after effect of heavy workload whereas in females, and in males with sedentary work, osteoporosis and muscular insufficiency are more likely to cause back complaints. The time that had lapsed since retirement—approximately 15 years—might also have muted possible differences between the groups studied.

The findings on inspection and palpation of joints included a rather high prevalence of deformities (e.g. hallux valgus, lowered transversal foot arches and enlargement of DIP joints) but local joint pains, swellings and tenderness were unusual except for those due to rheumatoid arthritis. Thus, in most individuals with, e.g., enlargement of the DIP joints, no such local symptoms were still present at age 79. Why right wrist and finger joint impairments were found more often than left is difficult to ascertain, but traumatic injuries might play a role for this side difference. Previous investigators of OA of the hands (1, 19, 28) have also reported side differences.

The absolute values obtained at the registration of joint ROM were directly transformed into ROM sectors according to commonly used clinical classifications (2, 6). The material, thus, does not allow a presentation of the distribution of the absolute values. The present investigation aimed at giving an estimate of the prevalence of more advanced ROM impairments that could also result in disability. In the majority of subjects with such advanced restriction of ROM the cause of the restriction was obvious. Thus, among those with restricted range of motion below 50% of reference values (6) in hips or shoulders, at least 2/3 had a history of previous trauma or rheumatoid arthritis.

As also found in previous investigations (14, 31, 35), no significant differences of ROM between left and right side were observed in the present study. Spangfort (35), reported a tendency to better mobility of left than of right hip in healthy women aged 69; similar observations were made within the present study.

One of the aims of the present longitudinal study of 70-year-olds was to investigate the prevalence of definable disorders in elderly, and to use proband groups lacking symptoms of definable diseases for the calculation of clinical reference values (22, 36, 37). Although a considerable proportion of the 79-year-olds had some restriction of their range of motion compared to younger individuals, it should be emphasized that in the vast majority of probands this restriction was rather limited and could be as-

cribed as a stiffness of the locomotor system that could be due to either ageing processes with a decrease in elastic tissue components or to age related changes in behaviour and physical activities. Joint problems and/or functional defects also existed to a considerable extent in subjects lacking indications of definable joint disorders, e.g., RA, gout, and obvious posttraumatic sequelae. Thus, a general conclusion is that ageing per se is accompanied by a rather high frequency of minor joint impairments but slightly restricted joint motion rarely causes joint complaints.

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Address for offprints:

Gunilla Bergström, M.D.
 Dept of Geriatric and Long-Term
 Care Medicine
 Vasa Hospital
 S-411 33 Göteborg
 Sweden