

## A history of physical activity, health and medicine

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### Exercise in ancient times

The importance of physical development in early eastern civilizations is recorded in many tomb drawings. Even in primitive society physical culture was important, often ritualized into dance and similar activity<sup>1</sup>. The earliest records of organized exercise, as a formal means of health promotion, are from the ancient China approximately 2500 BC. Hua T'o (ph; Wha Toe), a legend in Chinese surgery, encouraged exercises modelled on the movement of animals, principally the Tiger<sup>2</sup>. Kung Fu, which we now wrongly associate with violent combat, began initially as medical gymnastics, and may have been adapted from Yoga practised on the Indian subcontinent.

### Greeks, athletes and hygiene

The best known of the Greek physicians was Hippocrates (c. 460 BC-370 BC) a doctor-teacher on the island of Cos and author of many treatises on health<sup>2</sup>. The philosophy and ethos of modern medicine mimic many of the principles of Hippocrates and the Greek school emphasizing the importance of the psychological background to illness, understanding the patient within their own environment and the integration of the science and art of medicine. The Greeks also emphasized the importance of physical well-being, fitness and a healthy active lifestyle. Plato, a contemporary of Hippocrates is remembered for 'Mens Sana in Corpore Sano' which defines the Greek ideal of physical and mental health.

Physical activity was an integral part of education and most education took place at the Gymnasium. Plato's Academy was named after Akademos, a gymnasium. Aristotle's school was located at Lyceum, another gymnasium. Greek youth were encouraged to take part in organized games and the successful athlete had considerable status. There was a long tradition of Greek athletics predating even Homer's *Iliad* which describes the funeral games for Patroclus (seventh century BC). Many early Greek sculptures, reliefs, archaeological exhibits depict sport of which the best known is the often copied discus thrower of Myron. Physical health and gymnastic activity were important not only for the youth but had a wider application in health where exercise was seen as a means of treating disease and disability. Medical treatment included diet, daily exercise, and temperate behaviour in eating, drinking, sleeping and sexual indulgence.

The major athletic festivals were the panhellenic games at Olympia, Delphi, Isthmia and Nemea but

there were many local athletic festivals such as the Panathenaic festival at Athens<sup>3</sup>. The festivals were held every 4 years but Olympia was the most important. They were dominated initially by the upper social classes but soon valuable prizes became commonplace and athletes could afford to prepare themselves full-time. This was the birth of the professional athlete.

These full-time athletes did not find favour with those who promoted physical culture for health. The great philosophers held the professional athletes in poor esteem. Hippocrates expressed doubts about intense physical activity. In *Nutrimet* he states 'The condition of the athlete (diathesis) is not normal. A healthy state (hexis) is superior to all'. He also encouraged moderation 'excessive and sudden filling or emptying or warming or chilling or otherwise stirring the body is dangerous . . . any excess is hostile to nature' (Hippocrates quoted by Galen<sup>4</sup>).

Galen (c. 200-129 BC) wrote many works on medicine, philosophy, rhetoric and grammar, and an extensive essay on gymnastic exercises in a major work on health (*De Sanitate Tuenda*). He recognized the considerable benefits of moderate exercise and indeed promoted moderate exercise for health of both body and intellect but had little regard for the excess of professional athletes. He encouraged young men to study the arts rather than become athletes stating:

while athletes are exercising their profession their body remains in a dangerous condition, but when they give up their profession they fall into a condition more powerless still; as a fact, some die shortly afterward; others live for little time, but do not arrive at old age . . . Athletes live a life quite contrary to the precepts of hygiene, and I regard their mode of living as a regime far more favourable to illness than to health.

Galen quotes Hippocrates, who considered that professional athletes trained to excess 'The perfect condition which these fellows strive for is dangerous'. Hippocrates believed in moderation: 'To keep well, avoid too much food, too little toil'<sup>4</sup>.

There was considerable friction between athletic trainers, known as paedotribes, and medical opinion. Professional athletic trainers had learned practical physiology and the principles of athletic training empirically and medical philosophers did not always agree. 'Health science', part of the repertoire of the trainer, was countered by a new subject 'hygiene' to be taught by the physician. Galen believed that there was one single comprehensive science of care of the body, which was divided into therapy for the ill and maintenance of health in the healthy<sup>5</sup>.

### The Roman Empire and the decline of athleticism

During the Roman Empire (up until c. 500 AD) the health benefits of exercise continued to be recognized. Physical fitness was an essential military skill but was also seen in a more general context. Fitness and health were seen as part of dietetics, a branch of medicine that included regulation of food and drink, exercise and bathing. Advice on dietetics was often provided by the trainers at the baths while medical treatment was available from doctors in small booth like shops that flanked the street entrance to the town baths. Doctors prescribed bathing not only for maintenance of health but also as a means of curing illness<sup>6</sup>. The baths varied from small private buildings to large municipal multi-sport and social centres at which all types of therapeutic and recreative exercise was undertaken. Roman inhabitants had 159 days of public holiday annually and much of this leisure time was spent at the baths<sup>3</sup>. The ruins of the baths of Caracalla (AD 211-17) in Rome contain baths for hot, cold and tepid immersion and two large rooms for exercising. There was a difference between the Roman attitude to athletic events and the Greeks. Romans, although willing to develop fitness through sport did not enjoy public participation but preferred the role of spectator. Among Romans, multi sport festivals modelled on the early Olympic Games were never popular.

After the downfall of the Roman Empire and the beginning of the Dark Ages the Church became a dominant influence. 'Body culture' fell into disrepute and scholarly, monastic aestheticism became more important<sup>1</sup>. As early as the third century AD, Cyprian of Carthage, a Christian bishop, preached that 'True Christians must shun with eyes and ears those vapid, dangerous, tasteless performances' (*De Spectaculus*<sup>4</sup>).

### The traditions of British sport

The role of sport in society continued to be dictated by affairs of religion and state. Sport was not an easy companion of Puritanism. The reading of *The Book of Sports*, which discussed sports and activities allowed on the Sabbath from the pulpit in 1618, during the reign of James I, highlighted changing attitudes and sport became more acceptable with the decline of Puritanism. The emergence of the public school as a cornerstone of English education once again highlighted the benefits of sport, particularly in education, where sport was seen as a stabilizing influence offering discipline. With these changing attitudes, sport was not only encouraged for its physical benefits but also for the benefit of the soul, a form of Christian-Judaic morality<sup>7</sup>. In contrast to the Dark Ages, exercise was considered a practical component of religion, hence the arrival of the 'muscular Christians', but as sport evolved it became, not so much a means to an end, but an end itself<sup>8</sup>.

### Exercise in the nineteenth century

Rowing was one of the earliest sports to have formal rules and organization in the UK and became the model for many investigations of intense physical activity. Galen's view that vigorous physical activity was harmful persisted, even into the nineteenth century, and it was this perception that prompted Morgan<sup>9</sup> to study the health of those who had participated in the University Boat Race. Morgan

studied longevity and subsequent effect on health of university oarsmen who had participated in the first 40 years of the Oxford and Cambridge boat race from the years 1829-1869. He found that the average length of life for each oarsman after the boat race, assuming an age of 20, was 42.2 years. The normal expectation of life at that time based on contemporary English life tables (constructed by Dr William Farr) was of 40 years. The extent to which life exceeded expectation was 2.2 years. Incidentally, he found that Oxford University crews lived longer than Cambridge crews (ie Oxford 3.7 years and Cambridge 0.7 years of life exceeding expectations). The contemporary view on intense physical activity is illustrated in Morgan's text, *University Oars*. Reverend Charles Wordsworth, afterwards Bishop of St Andrew's, is quoted: 'in those days we used to be told that no man in a racing boat could expect to live to the age of thirty'.

Rowing retained the interest of the medical profession and a further study by Hartley and Llewellyn<sup>10</sup> of the longevity of oarsmen who rowed in the boat race from 1829 to 1928 concluded

... that over the whole period of investigation the mortality experience of University oarsmen was appreciably superior to that of assured lives of their own generation, but that of late years this relative superiority had been shown to diminish.

They stated that since Reverend Charles Wordsworth's era, medical opinion had changed and physiologists and physicians felt the danger had been greatly exaggerated. They also believed that most would take the view that 'no young man will injure himself by rowing provided that his organs are sound and that he has previously undergone a proper course of training'.

Hartley and Llewellyn quoted Dr Louis I Dublin<sup>11</sup> who studied the life histories of 4967 college athletes, graduates from 10 of the eastern colleges in the USA. Taking the group of athletes and comparing them with American men, the mortality of college athletes was 91.5% of American men. When reviewing the medical histories of groups either as athletes alone or as honours graduates alone, Dublin found that honours men showed distinctly lower mortality. Rook<sup>12</sup> confirmed this finding in an investigation into the longevity of Cambridge sportsmen when he found no evidence that sportsmen died at an earlier age than control groups and also found that intellectuals lived longer by a period averaging about 1.5 years. He conceded that this difference might well be due to chance. The hazards of rowing have continued to exercise medical minds. In an analysis of the life expectancy of college oarsmen of Harvard and Yale from 1882-1902 the difference between the athletes and controls was 6.35 years at Yale and 6.24 years at Harvard<sup>13</sup>.

Mortality due to heart disease has been studied in other sports. In a study of 355 men who had distinguished themselves in college football between 1901-1930 inclusive, the cause of death was found in 87 cases, and to be coronary heart disease in 25. Those in the coronary group engaged in less vigorous exercise than did the others and no individual in the study who maintained a heavy exercise programme happened to develop coronary heart disease. The authors concede however that the numbers were small but it is interesting to note this early association between

lack of vigorous exercise and coronary heart disease<sup>14</sup>.

It is also interesting to remark that James Mackenzie (1853-1925)<sup>15</sup>, that pioneer of general practice who first described the polygraph, defended intense physical activity in sport and at work, at a time when severe exertion was considered harmful. He did not accept that exercise was harmful and is known to have challenged a Cambridge physician to send him a case where exercise had caused damage to the heart. Samuel Black<sup>16</sup>, of Newry, County Down (who first described angina in 1794), also noted the beneficial influence of physical activity and suggested walking as preferable to every other mode of exercise.

### Sport, exercise, work activity, and the amateur ethos

During the later part of the nineteenth century sport became more widely practised. During the Victorian era there were increasing provision of open spaces for parks and recreation. Leisure activity became more organized with the development of rules for cricket, rowing and rugby. The first Oxford and Cambridge cricket match was played at Lords in 1827, the first Boat Race in 1829 and William Webb Ellis first ran with the ball at Rugby school in 1823.

However, even into this century the laws governing many sports, including rowing, excluded those who performed physical activity at work on the basis that they were not true amateurs. Indeed rowing attracted considerable controversy through the exclusion of those who worked with their hands under rule 1(c) of the general rules (manual labour). The most celebrated examples was the exclusion of John B Kelly from Henley Royal Regatta as recently as 1920 when it was alleged that this one time bricklayer could not be an amateur due to the manual nature of his occupation<sup>17</sup>.

### Exercise and occupation

The relationship between physical activity at work and coronary heart disease was to come to prominence later. One of the earliest comparisons between sedentary work and active work is that of the Sanitary Circumstances of Tailors in London by Smith in 1864<sup>18</sup> which described the work patterns of tailors, and concluded that mortality among tailors was much higher than that of agricultural labourers. Smith also observed that they were 'a feeble and sensitive class, and in only a very small minority of cases give evidence of health equal to those engaged in many other indoor occupations'.

While physical activity at work was the pattern of the lower classes, coronary heart disease was at that time an affliction of the upper social classes, described by Osler<sup>19</sup> in 1910 commenting on the 'remarkable fact with which we are all familiar, that angina pectoris is an affection of the better classes, and not often seen except in private practice'.

This pattern was further illustrated in the *Occupational Mortality Supplement* for 1930-32 which recorded a considerable excess of coronary mortality in the men of social classes 1 and 2. Discussion suggested that sedentariness of work and nervous and dietary factors may be involved (Registrar General 1938 Decennial<sup>20</sup>). Thus, the association between physical inactivity and coronary heart disease was illustrated in British social class data indicating that

coronary disease mortality in the professional and business class was double that of unskilled workers.

One of the earliest epidemiological studies of cardiovascular disease incidence was reported by Hedley<sup>21</sup> in 1939 in US Weekly Public Health Report where he noted the association between coronary mortality and occupation. Mortality from acute coronary occlusion was highest among men in the business and professional groups and was particularly so among professional men aged 55-64 years of age where the estimated mortality was considerably higher than other groups especially manual workers.

Epidemiological evidence suggesting a link with physical activity at work began to emerge. A study on bus conductors and drivers, and postal clerks and postmen in London in 1953 found that clerks had higher coronary heart disease death rates than the postmen<sup>20</sup>. It is possible that these results may have been due to variations in the characteristics of the subjects but these early studies, even with potential methodological errors, drew the attention of epidemiologists to the beneficial effects of physical activity and were the precursor to many subsequent investigations.

The suggestion that exercise was harmful was discredited by Mackenzie<sup>15</sup> as early as 1912 and Abrahams in his major review<sup>22</sup> in 1951 emphasized that strenuous exercise had no immediate ill effect on the normal heart. The evidence linking physical activity to reduced coronary disease mortality continued to increase and many epidemiological studies in the last 40 years provide convincing evidence of the cardiovascular benefits of physical activity. Indeed, some enthusiasts may have exaggerated the benefits of exercise. Bassler stated that no one who had run a marathon ever developed coronary heart disease. He modified his statement in 1975 to say that marathon runners were immune to coronary heart disease as long as they maintain fitness and do not smoke<sup>23</sup>. Unfortunately, his theory has since been disproven, sometimes in dramatic fashion, by sudden death in highly trained athletes. Exercise offers protection but it does not confer immunity.

There is now little dispute that exercise is beneficial<sup>24</sup> and the profession are encouraged to promote exercise as an integral part of preventive care<sup>25</sup>. The public too are enthusiastic, which encouraged Morris<sup>26</sup> to write that whatever doubts the medical profession may have had 'the public may be said - literally - to be voting with its feet'.

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(continued on p 39)