The effectiveness of exercise in cardiac rehabilitation

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The American Heart Association (2007) identifies cardiac rehabilitation as a programme to help slow the progression of, or even reverse the effects of cardiovascular disease in addition to improving the psychological, social and physical condition of the patients. Some of the methods by which this is done include exercise prescription, drug prescription, education regarding risk factors and methods of intervention along with continued help and support in adhering to the rehabilitation programmes. According to The British Heart Foundation Statistics Database (2004), cardiovascular diseases were known to account for one in three deaths in the United Kingdom (UK) in 2002. The British Heart Foundation (BHF) (2007) estimate that there are around 2.6 million people currently living with heart disease in the UK, with 60% unable to access cardiac rehabilitation programmes. This is clearly a major problem when you consider that a quality cardiac rehabilitation programme can help to reduce the chance of heart disease causing fatality by 26% (The British Heart Foundation, 2007). This literature review will focus on the extent to which exercise is an effective method of cardiac rehabilitation. The strengths and limitations of current research will be considered along with its relevance to physiotherapy in practice. The review will conclude with a proposed research question, based on any gaps found in the current research.

Much of the recent research into cardiac rehabilitation has taken interest in comparing the outcomes of exercise intervention with no intervention in the form of control trials (Belardinelli et al. 1999; Kobashigowa et al. 1999; Marchionni et al. 2003; Newell et al. 1980; Vaz da Silva et al. 2002; Willenheimer et al. 1998; Wright et al. 2002). These studies share the common finding that exercise rehabilitation, be it in the form of aerobic exercise or a combined aerobic and strength programme, is more beneficial to patients who have suffered cardiovascular disease than no exercise intervention. Others have taken this further by accepting that exercise is beneficial and therefore choosing to compare varying intensities or frequencies of exercise within rehabilitation programmes (Adachi et al. 1996; Hung et al. 2004; Wannamethee et al. 2000; Worcester et al. 1993). This research has been useful in concluding that exercise in general, be it of moderate or high intensity, can be beneficial to patients during cardiac rehabilitation.
Higher intensity exercise however, was found to reap the benefits in terms of improvement of cardiovascular function more quickly, sometimes even to a higher level (Adachi et al. 1996). However, the fact that the intervention groups in this study had to complete the given exercise programme twice a day, five days per week for the first two months needs to be considered. It has to be taken into account that patients may lead busy lives; therefore this frequency of exercise could be inconvenient or even impossible for patients to comply with, even if the duration of the exercise sessions each day are brief. Although the interventions used may be unsuitable for the general population, this research is conclusive in terms of the benefits of frequent exercise and can certainly be used in practice by physiotherapists. As exercise specialists, physiotherapists can apply the knowledge that exercising at this frequency and intensity is beneficial by prescribing exercise that will hit these levels whilst fitting in with a patient’s daily routines and ensuring the programme is tailored to the individuals needs.

One point that became evident within the literature is that it seemed to utilise far more male than female participants. The reason for this may be due to the availability of patients with the specific cardiovascular pathologies required for the individual studies. Hung et al. (2004) carried out the only study comprising of solely female participants, and compared the effects of different types of exercise over an eight week long period. The findings suggest that women suffering from coronary artery disease respond well to both aerobic training and aerobic combined with strength training in terms of improving cardiovascular fitness. However, this study had a very small sample size, which makes it hard to generalise the results across the whole population of women suffering from this condition.

In view of the fact that in the year 2002 more than 45% of deaths caused by coronary heart disease (CHD) were females, the imbalance in male to female inclusion within current research seems unjustified (The British Heart Foundation Statistics Database, 2004). The lack of investigation into possible differences in the responses of men and women to exercise rehabilitation currently means that exercise programmes will be delivered similarly to both men and women when this may not be the best approach. To give credence to this, Willenheimer et al. (1998) found men with ischaemic aetiology responded better to exercise intervention than women with similar pathologies, further suggesting there is the need for research into the role of exercise rehabilitation in women suffering from cardiovascular disease.
The British Heart Foundation Statistics Database (2004) reported that, in 2002, 86% of deaths caused by CHD were in the age group of 65 and over. With this taken into account it seems that research focusing on patients with a mean age of 50 to 60 is ignoring the sector of the population with the biggest risk of fatality as a result of cardiovascular disorders such as CHD (Adachi et al. 1996; Belardinelli et al. 1999; Izawa et al. 2004; Kobashigowa et al. 1999; Meurin et al. 2005; Newell et al. 1980; Nieuwland et al. 2000; Ueshima et al. 2004; Vaz da Silva et al. 2002; Worcester et al. 1993). In the research carried out by Marchionni et al. (2003) two thirds of the 270 participants were over the age of 65. The findings in this research suggest that exercise intervention can improve cardiovascular function of the over 65 population. Another finding was that the over 65 intervention group who were given home exercises rather than instructed sessions, retained the positive outcomes for a longer period of time.

In terms of applying this research to practice, should further research prove that home exercise can be of more benefit to the over 65 population, then physiotherapists can place more emphasis on home based exercise programmes when prescribing cardiac rehabilitation exercises. Home exercises are often better suited to the elderly as long as they can be performed safely, as it avoids unnecessary travel to rehabilitation units when this may be dangerous (potentially due to bad weather increasing the risk of falls) or expensive for the patient. However, this study used questionnaires as part of the investigation to assess the condition of the patients. Questionnaires carry the risk of the patient not understanding or misinterpreting questions, along with their true answer not fitting the options given in a quantitative questionnaire due to closed questions being used. The study also had a high rate of patients who pulled out of the study; the reasons for all of the patients who did so are not specified. As a result of these weaknesses it is evident that more research is required in order to confirm the extent of the benefits of exercise in cardiac rehabilitation in the over 65 population.

In addition to research often neglecting the over 65 population, it has often been short in duration with the vast majority of the exercise programmes in the literature reviewed lasting four months or less (Adachi et al. 1996; Franklin et al. 2002; Hung et al. 2004; Izawa et al. 2004; Larsen et al. 2001; Meurin et al. 2005; Nieuwland et al. 2000; Rhodes et al. 2006; Vaz da Silva et al. 2002; Willenheimer et al. 1998; Worcester et al. 1993; Wright et al. 2002).
Although four months is adequate for the benefits of exercise to have an impact on an individual, the lack of follow up investigations in these studies means that it is inconclusive as to whether the effects of the exercise rehabilitation programmes have lasting effects. Therefore it is not clear from the perspective of a physiotherapist whether exercise as a method of rehabilitation should be continued for a prolonged period, or whether a set programme of a fixed time period will benefit the patient in the long term.

Stahle et al. (1999) however, did conduct a study which lasted over four months with follow up investigations at three months, six months and one year after the study commenced. The findings of this research suggest that the benefits of a three month long exercise programme cannot be maintained over a full year. This study, one of few to follow up patients over the course of a full year, suggests that exercise levels must be maintained beyond the period of supervised exercise or beyond a period of three months for the benefits to be sustained. This would seem to give physiotherapists the capacity to either extend the period of time patients attend cardiac rehabilitation classes or alternatively provide grounds for long term home exercise to be prescribed with regular progress check ups. There are however various limitations to this study. Although a qualified physiotherapist supervised the intervention group for the first three months, the control group was actively encouraged to return to normal exercise when they felt ready. Due to this the significance of the results may be skewed as it is possible that the control group were exercising at a level equal to or above that of the experimental group.

The research of Stahle et al. (1999) can also be questioned due to the statistical methods used. By presenting results in terms of mean values and standard deviations about the mean scores the results are quantified and comparable. However, these statistical methods are used on the feedback from a quality of life questionnaire distributed to patients. Questionnaires as discussed above can be unreliable and may include leading questions, not truly reflecting the views of the patients. As a result, the accuracy of the results in terms of them reflecting the patient’s true feelings may be called into question. The findings however cannot be discounted as the research has many good qualities, one being the high number of participants (101 patients), meaning there was a larger representation of the population than a smaller scale study. Another useful quality of the research was the age of the participants; that being the over 65 sector of the population which as mentioned earlier are the most at risk of death from cardiovascular disease. In concluding that the benefits of a short term exercise
programme cannot be maintained, a gap is brought to light where further research into the benefits of prolonged exercise as opposed to short term exercise is required.

In conclusion it has been unanimously found that exercise is a safe and beneficial form of cardiac rehabilitation by and large. The review has also pointed out some of the downfalls of current research, including the numbers of females taking part, the duration of the studies and the age of the patients recruited. Although there are many areas that need to be investigated further, one gap in the research seems to be the difference in the effects of exercise between males and females over the age of 65 suffering from cardiovascular disease. In light of this an appropriate research question that may be considered could be; how do the effects of an exercise rehabilitation programme differ between men and women over the age of 65 years over a one year period? If the research included control groups for both genders and also considered differences between the intervention groups, there may be scope to improve the way in which rehabilitation programmes are constructed. It is obvious to point out that there may be difficulties in matching participants and the level of exercise prescribed would need to be carefully considered. However, thus far research has failed to identify differences between genders. Therefore this research question could prove important in ruling out any differences between genders in their response to exercise, or could lead to different approaches being taken in the future by physiotherapists with regard to exercise prescription in cardiac rehabilitation.

References


## Appendix 1

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