Decompression Sickness in Women: A Possible Relationship with the Menstrual Cycle

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Background: Women are increasingly participating in recreational scuba diving and the professional roles of women are expanding in the fields of aviation, space, and diving. Evidence exists that there may be a relationship between altitude decompression sickness (DCS) and the menstrual cycle, although diving studies to support such findings are limited. The aim of the present study was to investigate the presence of any relationship between the development of DCS in female sports divers, the phase of the menstrual cycle, and the use of the oral contraceptive pill (OCP). ***Method:*** Personal, dive, symptom, and menstrual history details were collected by questionnaire from women treated with hyperbaric therapy for DCS in 23 treatment centers worldwide. ***Results:*** There were 150 records suitable for analysis. The phase in the menstrual cycle of the DCS incident was estimated. The DCS incidents were unevenly distributed throughout the cycle ($p = 0.001$) with the greatest percentage of incidents occurring in the first week of the menstrual cycle. The variation in incidence across the cycle appeared to be greatest for the non-OCP users ($p = 0.01$), and when age was taken into account there was a significant difference between the OCP and non-OCP users with respect to risk of DCS across the menstrual cycle ($p = 0.03$). ***Conclusion:*** These data suggest that the risk of DCS may be dependent on the phase of the menstrual cycle and that the distribution of risk differs between OCP and non-OCP users.

Keywords: women, scuba diving, decompression illness, menstruation.

INCREASING NUMBERS of women are participating in sports diving (British Sub Aqua Club and Professional Association of Diving Instructors. Unpublished data; 2001). Additionally, careers are opening up to women in commercial diving (UK Health and Safety Executive. Ralph Mavin. Personal communication; 2001) and, in many countries, military flying (4). A greater number of women than ever are, therefore, being exposed to the reduction in pressure that may place them at risk of decompression sickness (DCS). Several studies suggest that there may be a greater susceptibility to symptoms of DCS in women compared with men. However, the available evidence is inconclusive and conflicting. While some studies suggest a substantially greater risk associated with women (1–3,5), others suggest little or no difference in risk (7,9–11,18,19,21).

A small number of studies have investigated the effect of the menstrual cycle on the risk of DCS in women. Dunford and Hampson (7), Krause et al. (14), and Rudge (15) have indicated that the risk of DCS in women may be related to the phase of the menstrual cycle. In a study analyzing the development of symptoms of DCS in 81 women exposed to simulated altitude in a hypobaric chamber, Rudge (15) found a significant inverse linear correlation between the number of days since the start of the last menstrual period and the incidence of DCS. Krause et al. (14) also reported a correlation between menstrual day and DCS incidence in 62 females who developed DCS on exposure to a hypobaric environment, with the greatest probability of DCS developing on day two of the menstrual cycle. Dunford and Hampson (7) concluded that menses is a significant risk factor for hyperbaric chamber attendants but, interestingly, not for recreational divers in open water. However, this conclusion was based on the menstrual history from just 9 female hyperbaric chamber attendants and 24 female recreational divers with DCS. In one further study, while no effect of the menstrual cycle was demonstrated, it was observed that all five female subjects who experienced hypobaric DCS were in menses or the early phase of their menstrual cycle (5).

Furthermore, a small number of studies have attempted to identify the effect of the oral contraceptive pill (OCP) on the incidence of DCS in women. The available evidence provided by these studies, however, is not conclusive. One retrospective study, based on 29 women who had described symptoms but had not all required hyperbaric treatment, found that there was no difference in DCS between women taking the OCP and non-OCP users (1). In contrast, a study using data collected between 1989 and 1995 of 956 women concluded that OCP users are significantly more likely to experience DCS if they scuba dive while menstruating (6). This was compared with non-OCP users who, it was concluded, are not at greater risk while menstruating

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