

Safety behaviour to avoid drowning – Should we ‘Float First’ on accidental immersion?

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Introduction

Approximately 400,000 people accidentally drown in the world each year, many of whom are children and who fall in to water whilst clothed. This may be attributable to a lack of basic swimming capability and appropriate survival skills. However, low water temperature is also implicated in these drowning statistics as cold water triggers the ‘cold-shock’ response (2), disables breathing and reduces swimming capability (1). Therefore, it is sensible to ‘float first’ for the initial 2–3 minutes of immersion whilst cold shock subsides. The ability of immersed adults, children and adolescents to float in clothing is unknown but it remains possible that air trapped between clothing layers increases buoyancy. This study aimed: a) to quantify the buoyancy of clothed immersed individuals, b) to examine whether any inherent buoyancy is reduced with clothing layers and, c) to determine whether swimming on immersion releases any air present at a faster rate than remaining still (floating).

Methods

The buoyancy provided by four seasonal clothing assemblies was examined, before and after floating or swimming using a brief (20s) underwater weighing procedure with 12 males volunteers (age 22 (3) yrs, 1.78 (0.1) m, mass 75.7 (9.7) kg, body fat 14.0 (8.4) %) and 12 female volunteers (age 21 (3) yrs, 1.69 (0.1) m, mass 66.8 (9.7) kg, body fat 29.0 (4.0) %). The practical consequence of any buoyancy was measured by an assessment of freeboard (mouth to water level distance) and expressed as a percentage of occasions where freeboard was achieved. The float capability of children and adolescents who fell backwards in to a swimming pool and completed either a ‘float only’ condition or swam for 69 [14] s (25m) was also examined. Freeboard was used as the outcome measure. Sixteen males age 13 (3) yrs, 1.55 (0.2) m, mass 51.6 (17.2) kg, body fat 18.1 (5.3) % and 13 females age 12 (2) yrs, 1.51 (0.1) m, mass 45.1 (14.0) kg, body fat 24.3 (6.2) % were tested.

Results

Mean [SD] buoyancy (Newtons N) in each clothing condition on initial immersion was: Winter 105 [12]; Autumn/Spring 87 [13]; Summer 68[11]: all greater than the control condition; 61[11]. This diminished to a similar extent within-condition after floating or swimming; Winter 75 [17], Autumn/Spring 72 [12], Summer 68[9]; again all conditions were greater than the Control 61[11]. Average freeboard was Winter 63 [2] %, Autumn/Spring 62 [2] %, Summer 66[2] %, Control 15 [1] %; n=24, but showed variation due to gender, being lower overall in males (24[9]%) than females (88[30]%) due to body composition. Children were more buoyant (95 [17]%) freeboard achieved), irrespective of gender, than adults and perceived the effort required to swim a short distance (24 [4] m) in clothes as being significantly more difficult (6 [2]) out of 10) compared to remaining still (3 [2] out of 10); likert scale from 1–easiest exercise to 10 maximal exercise.

Conclusion

Significant buoyancy is provided by air trapped between clothing layers and the consequent buoyancy remains higher than that seen in a swim suit (Control). ‘Float first’ on accidental immersion is recommended as a behavioural strategy for the first few minutes of accidental immersion. This policy is designed to aid immersed victims in the critical first 2–3 minutes of immersion when the ‘cold-shock’ response (2) is likely to be greatest, swim capability will be reduced (1) and swimming a short distance may be more difficult whilst clothed, particularly for young children. ‘Float first’ could be included as part of learn to swim campaigns as a basic survival skill.

References

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