microbes up to 10 wash cycles. After that, the antimicrobial activity deteriorated, was very low at 20 wash cycles and with no activity at 30 wash cycles. It is also evident that the micro-encapsulated samples exhibit good resistivity against both gram positive and gram negative microbes up to 10 wash cycles, which dropped at 20 wash cycles [17].

The nano encapsulated method displays good antimicrobial activity in terms of bacterial reduction percentage up to 20 wash cycles and shows moderate antimicrobial activity after 30 wash cycles, with both gram positive and gram negative microbes. It reveals that the nano encapsulated sample exhibits good wash durability in comparison to the micro encapsulation and direct exhaust methods.

Conslusions

Coleus Ambonicus finished fabric samples show good microbial reduction percentage in both *staphylococcus aureus* and *Escherichia coli* microbes in all three methods at zero washes. The nano encapsulated fabric sample exhibits good wash durability in terms of the bacterial reduction percentage even after 30 wash cycles, whereas the direct method and micro encapsulated method of finishing showed less durability after 10 and 20 wash cycles, respectively.

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Received 29.11.2016 Reviewed 20.03.2017