

FROM COMMUNICABLE TO NONCOMMUNICABLE DISEASES AND INJURIES

Teaching about noncommunicable diseases in low- and middle-income countries: A student-led and easy-to-implement educational module

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Background: Health conditions in low- and middle-income countries (LMICs) are becoming more like those in developed countries, with noncommunicable diseases (NCDs) rising rapidly and infectious diseases declining. Driven by changes in lifestyle related to shared risk factors such as high dietary sodium consumption, physical inactivity, and alcohol and tobacco use, the surging burden of NCDs in LMICs demands attention that is wanting in public health and medical curricula. Therefore, this module was designed to help health profession students acquire the knowledge and skill sets necessary to plan and execute a policy or program to address NCDs in LMICs, a valuable foundation that will be applicable in their future careers.

Structure/Method/Design: The NCDs module consisted of a two-part, 5-week experience nested into a pre-existing global health course for Yale medical, public health (PH), nursing, and physician assistant (PA) students. Part 1 consisted of four lectures from multidisciplinary speakers: a physician working to build NCD research capacity and infrastructure in LMICs; a health communications specialist tailoring campaigns to promote behavioral change; an advocacy manager focused on putting NCDs on the global policy agenda; and a physician developing kidney disease programs in developing countries worldwide. The second part of the module consisted of a parallel student project. Students utilized knowledge and skills learned from the speakers to research and present sustainable, targeted NCD interventions. These interventions were required to be both cost-effective and feasible in the local context. We assessed the impact of the module using matched pre- and post-module surveys designed to assess the knowledge, skills, and attitude objectives regarding NCDs.

Results (Scientific Abstract)/Collaborative Partners (Programmatic Abstract): Not applicable

Summary/Conclusion: Forty-three students completed the pre- and post-module surveys (9 medical students, 3 PA, 2 nursing, and 29 PH students). Prior to the module, students rated their exposure to NCDs in resource-limited settings as moderately low to moderate. Divided into 12 groups, students completed projects on topics of their interest, such as "Type II Diabetes in Nicaragua: Management and Prevention" and "Indoor Air Pollution: Challenges in Rural China." Post-module surveys indicated significant improvement across all 24 knowledge and skills objectives regarding NCDs. Notably, students gained knowledge in using epidemiological data in the cultural context to tailor interventions to affect sustainable change ($P < 0.001$) as well as skills in analysis ($P < 0.001$) and feedback of NCD programs ($P < 0.001$). Finally, students' overall satisfaction with the module was rated as moderately high.

This well-received, easily implemented, student-led module addresses a growing burden in global health and serves as a model to incorporate this topic into health care training at other institutions.

Evaluation of Surinamese medicinal plants for their potential influence on angiogenesis in embryos of the zebra fish *Danio rerio*

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Background: Preparations from the aerial parts of the true aloe Aloe vera (L.) Burm.f. (Xanthorrhoeaceae), the wild sage Lantana camara L. (Verbenaceae), and the bitter melon Momordica charantia L. (Cucurbitaceae); the leaves of the Chinese cinnamon Cinnamomum cassia (Nees & T. Nees) Farw. (Lauraceae); the bark and young leaves of the guava Psidium guajava L. (Myrtaceae); and the roots of the eggplant Solanum melongena L. (Solanaceae) are popularly used in Suriname for treating wounds. In this study, aqueous extracts from these plants have been evaluated for their potential to influence angiogenesis. To this end, the extracts were assessed for their effects on the regeneration of the amputated caudal tail fin, as well as total sub-intestinal vessel and body length of zebra fish embryos.

Structure/Method/Design: Embryos from wildtype (AB) and Tg(fli1a:EGFPy1)/+ zebra fish of which the caudal tail fin had been amputated, were exposed to serial dilutions of the plant extracts between 10⁻⁷ and 10⁻⁴ g/mL. The effects of the extracts on the regeneration rate of the caudal fin were determined at 48 hours post-fertilization (hpf) by comparing the longitudinal distance of the fin growth with that of sham-operated embryos. In parallel, the plant extracts were assessed at the indicated concentrations at 96 hpf for their effects on the total sub-intestinal vessel and body length of the embryos by examination under a stereomicroscope and a fluorescence microscope, respectively, followed by processing of the data with the Axiovision 4.8.1 software, and comparison with untreated controls.

Results (Scientific Abstract)/Collaborative Partners (Programmatic Abstract): Up to 10⁻⁴ g/mL, none of the plant extracts improved the regeneration rate of the amputated caudal fin or increased total sub-intestinal vessel or body length of the zebra fish embryos. On the contrary, exposure of the animals to the L. camara extract at 10⁻⁵ and 10⁻⁴ g/mL led to a decrease of the total sub-intestinal vessel length of more than 50% and almost 100%, respectively.

Summary/Conclusion: None of the plant extracts evaluated in this study displayed wound healing or pro-angiogenic properties under the experimental conditions applied. However, the L. camara preparation may possess interesting anti-angiogenic characteristics. Cell culture studies to verify this suggestion using human umbilical vein endothelial cells are in preparation.

Helminthiasis in Bocas del Toro, Panama—NGO patient records as an indicator of broader health-burden trends

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Background: Floating Doctors (FD) is a 501(c)(3) non-profit organization that provides free medical care to difficult-to-reach indigenous (Ngobe) populations in Bocas del Toro, Panama. FD partners with students and physicians throughout the United States and the world to bring their patients quality medical care. The Ngobe communities served by FD lack accurate population and health data, which makes determining burden of disease in these regions challenging. Analysis of FD's patient database may reveal broader health trends in these unserved communities.

Structure/Method/Design: All 2968 entries in the FD electronic database containing complete demographic and health data for