Assessment of Knowledge in Concepts Related To Cardiovascular Physiology Among Biomedical Engineering Students in Chennai

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Abstract: *Nullifying the misconceptions related to Scientific Phenomena that eventually creeps into intellect of the student population is a major purpose of efficient Medical Education and Research. This is a necessary expectation of Higher education as alternative conception breeds more incongruence in understanding and would generate more misalignment. This means that a student's aberrant conceptions would hinder effective concept learning and application in the future.*

This study is related to the realms of Medical Education for Biomedical Engineering students and it aims to assess the knowledge base in concepts related to cardiovascular physiology and to decipher the aberrant understandings if any related, to the intricate facets of the faculty of Cardiovascular Physiology among Biomedical Engineering students.

The study was conducted in an Engineering College and the study group was 100 Biomedical Engineering Students. Assessment of the aberrant understandings if any is accomplished by a carefully designed questionnaire and the assessment is by both Pre and Post - Intervention modules; the intervention being a conceptual lecture by a physiologist designed to explain the various ramifications of the statements furnished in the questionnaire. The questionnaire was anchored amidst three different domains of Cardiovascular Physiology in concepts related to Hematology, Circulation and Vascular physiology.
Regarding the levels of alternative understanding in the pre – Intervention module, it was 3.53 % for the Haematology; 3.43 % for circulatory physiology and 3 % for vascular physiology.
Post – Intervention, the scores were completely nullified and the students were left with no alternative conceptualization of the scientific phenomenon related to Cardiovascular Physiology.
Keywords: *Human Circulatory system, Alternative conception, Assessment.*

I. Introduction

Biomedical Engineering is a vibrant speciality in medical sciences involving nascent and an ever expanding knowledge base. It has the potential to transform the way research and treatment is accomplished among human species. Students pursue education with varied preformed concepts which may at times be very different from actual biological principles.The concept of research related to unearthing the alternative misconceptions in the thought process of professional students are done very less in physiology education, particularly true for this part of the earth.Understanding the prevalence rate of existence of alternative misconceptions among students is an important task with relevance to medical education, particularly related to Biomedical Engineering.

Appreciating and then nullifying the misconceptions related to Physiological Phenomena that eventually creeps into the intellect of the student population are an undeniable majorpurpose of efficient Medical Education and Research.This is a necessary expectation of higher education as conception of incorrect ideas deep within the cognitive apparatus would eventually breed in more incongruence in understanding and would generate more misalignment as they are incorrect representations of conceptual relationships.This means that a student's aberrant conceptions or existing alternative conceptions would hinder effective concept learning and application in the future.

Studies done elsewhere among various streams of professionals related to medical sciences has shown that misconceptions related to circulatory physiology is highly prevalent. The highest misconceptions present among the students were "the main function of heart is to purify and store the blood". Others are, (1). Pulmonary artery carries oxygenated blood and pulmonary vein carry deoxygenated blood; (2). Circulatory and respiratory relationship being gas exchange occur in all the blood vessels. Non realisation of the existence of misconceptions like these if not realised and were inadvertently ignored will result in the persistence of the same.

Aim and Significance of the study:

This study is related to the realms of Medical Education related to Biomedical Engineering students and it aims to assess the aberrant perceptions in the knowledge base related to Physiological phenomena of Cardiovascular Physiology among Biomedical Engineering students in Chennai.

II.   Material and Methods

This study is a survey studyconducted among one hundred Biomedical Engineering Studentsduring the timeline of September 2014.Institutional Ethical Clearance procured. Written Informed Consent was acquired from the subjects and imperative permission obtained from the concerned department.For the studentswho interacted in the study, Circulatory physiology has been done in the previous semester. The selected domains were common for all the students.Assessment of the aberrant understandings if any is accomplished by a carefully designed questionnaire with open ended questions.

 The assessment is by both Pre - Intervention and Post - Intervention modules; the intervention being a conceptual lecture by a qualified physiologist designed to explain the various ramifications of the statements furnished in the questionnaire.

The questionnaire was anchored amidst three different domains of Cardiovascular Physiology in concepts related to (1) **Haematology**–Subjects were enquired about the concepts like ; Site of production of blood elements; Functions of the Blood circulation ; Vitamin K deficiency and its relation to coagulation; Presence of Hemoglobin in the blood cells, etc.(2) **Circulatory Physiology** where the subjects were enquired about the concepts like; Physiological Functions of the Heart; Contents in arteries and veins; Affective control of the heart, etc. (3) **Vascular Physiology**where the subjects were enquired about the concepts like; relationship within the vascular tree , etc.The necessary statistical analysis was done by student's't'test.

After the intervention which includes a lecture by a qualified physiologist explaining in detail about the various concepts placed in the module. Post – Intervention, the scores were completely nullified and the students were left with no alternative conceptualization of the scientific phenomenon related to Cardiovascular Physiology.

III.   Results and Discussion:

Regarding the levels of alternative understanding in the pre – Intervention module, it was very meagre only. The pre-test score for knowledge related to **Haematology** was 96.47 while the post test score was 100 with a significant p value of 0.000. The pre-test score for knowledge related to **Circulatory Physiology** was 96.57 while the post test score was 100 with a significant p value of 0.000. The pre-test score for knowledge related to **Vascular Physiology** was 97 while the post test score was 100 with a significant p value of 0.000

Table 1:Knowledge in Concepts among the different domains in cardiovascular physiology in pretest and posttest.

	Mean	Number	Standard Deviation	P Value
Knowledge in concepts related to hematology – Pre test	96.47	100	9.551	0.000
Knowledge in concepts related to hematology – Post test	100	100	0.000	
Knowledge in concepts related to Circulatory Physiology– Pre test	96.57	100	2.257	0.000
Knowledge in concepts related to Circulatory Physiology– Post test	100	100	0.000	
Knowledge in concepts related to Vascular Physiology– Pre test	97	100	7.665	0.000
Knowledge in concepts related to Vascular Physiology– Post test	100	100	0.000	

Figure 1: Showing the Knowledge in Concepts among the different domains of ardiovascular physiology in pretest and post test
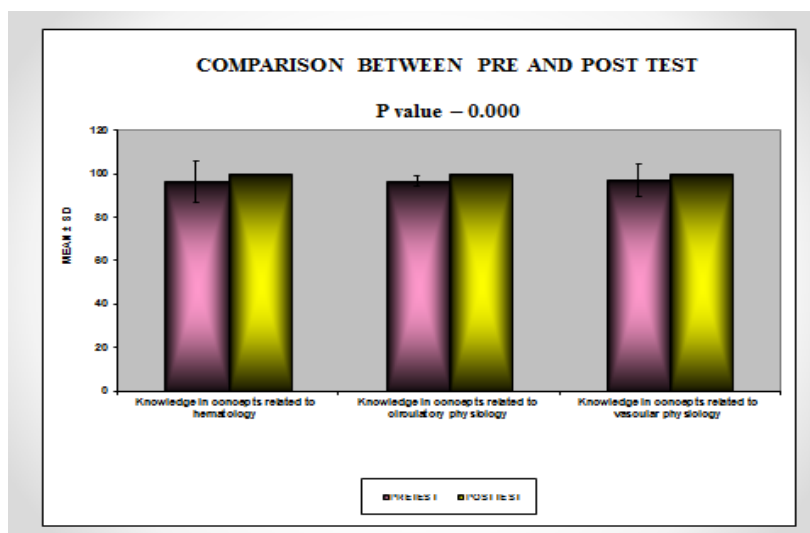
IV.   Conclusion:

In our study we were able to observe that Circulatory Physiology concept errors were indeed present among the students but only in very low percentage and that was also anchored to the domains of (1) Physiology of gas exchange occurring in the vessels; (2) Physiological Functions of the heart; (3) Psychophysiological link between Emotions and Heart; (4) Physiology of the Vascular tree and the functions of its unique components. The aberrant conceptualisations were swiftly nullified by the theoretical lecture delivered by a qualified physiologist who explained about the various ramifications of the statements furnished in the questionnaire.

References:

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