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Recall Type *vs* Problem-based Tests for Formative Assessment in Undergraduate Medical Students

We studied two types of formative assessment: recall type, and problem-based questions, with summative scores and previous grades in 77 fourth-year medical students. We found that the formative scores did not correlate well with the summative scores, but were associated with the Grade point average in the preclinical period.

During undergraduate training of medical students, there should be in-course formative assessment (FA) to provide feedback on performance, so as to promote better learning outcomes [1]. By contrast, summative assessment (SA) is an end-of-course assessment; it is predominantly used for grading and certification at the end of a study period, often without feedback to students on their performance [2,3].

However, the reliability and standardization of FAs is still uncertain [4]. So far, no studies have been undertaken on the impact of FA or type of questions used during FA [5]. Usually one type of MCQs is of recall-type questions, which are short questions about theory. The second type involves problem-based questions, which require critical thinking. Although, feedback on the performance is more important in formative assessment, rather than type of questions. The purpose of the present study was to compare the two types of FA with the final examination results and previous grade.

We studied fourth-year medical students who enrolled in the Department of Medicine at our university from April 2015 to March 2016. There were four groups, each with 19 or 20 students. The students took a formative examination, which consisted of 50 recall-type and 50 problem-based MCQs. At the end of the course, all the students underwent an SA with 50 recall-type and 50 problem-based MCQs. For the MCQs, we had two sets of questions (*i.e.*, two sets of recall-type and two sets of problem-based questions) and alternated the questions that appeared between the groups. We did not return the examination papers to the students, thereby eliminating the risk of the content being circulated among students who had yet to take an examination.

We observed that the FA scores (either recall or problem-based) significantly correlated with Grade Point Average (GPA) for years 1–3 (r=0.33, P=0.003). The final examination scores (SA) also correlated significantly with GPA (r=0.42, P<0.001); the recall type of FA showed significant correlations with the summative score (r=0.24, P=0.036); though, the degree of correlation was not high. The problem-based type of examination displayed no significant correlation with the final examination scores (r=0.15, P=0.18). The total FA score evidenced a low correlation (r=0.24) with SA. The students obtained better scores at the end of the course. The mean formative and summative scores are represented in *Table* **I**.

We found that the GPA during the first three years of study also correlated with the FA and SA scores. This result indicates that most students who achieved good academic marks during their preclinical studies also obtained favorable results in their clinical years.

We conclude that FA using recall-type questions is associated with summative achievement. The formative

TABLE I FORMATIVE ASSESSMENT AND SUMMATIVE ASSESSMENT SCORES IN FOURTH-YEAR MEDICAL STUDENTS (*N*= 77)

	Mean (SD)
Summative assessment	56.5 (7.84)
Recall, Formative assessment	49.1 (8.36)
Problem-based, Formative assessment	42.8 (7.73)
Total (recall+problem-based)	45.9 (6.52)

P<0.001 for all comparisons; Recall: percentage score of recall-type questions; Problem-based: percentage score of problem-based questions.

and summative scores also correlate with GPA in the preclinical period.

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Ketotic Hypoglycemia in Children with Previous Transient Congenital Hyperinsulinism

Congenital Hyperinsulinism (CHI) is a major cause of neonatal hypoglycemia characterised by non-ketotic hypoglycemia. We describe the occurrence and higher prevalence of ketotic hypoglycemia (KH) in 5 children with transient CHI. Four children had required diazoxide to control the persistent hypoglycemia that was discontinued at a mean age of 11.25 (+5.25) months. KH developed after an average time period of 6.7 months following the resolution of CHI. Children with transient CHI may be at risk of subsequently developing KH at a variable age period.

Keywords: *Neonatal hypoglycemia, Ketotic hypoglycemia, Outcome.*

Congenital Hyperinsulinism (CHI) is a complex genetic disorder causing recurrent and persistent hypoglycemia, affecting 1 in 50,000 children due to defective insulin secretion from pancreatic β-cells [1]. CHI, can be transient or permanent, and could be associated with overgrowth syndromes, birth asphyxia, IUGR, Rh isoimmunisation and maternal diabetes mellitus [2].

Ketotic hypoglycemia (KH*)* is the most common form of hypoglycemia beyond infancy, the exact etiopatho-genesis of which still remains obscure [3,4]. KH readily responds to oral or intravenous glucose administration without causing permanent neurological sequelae with majority of children outgrowing this condition with age. The development of KH after resolution of transient CHI has not been widely reported. We report our observations on KH after resolution of CHI.

After approval from the Institute's Ethics Committee the clinical data was collected from 142 children referred to our centre with persistent hypoglycemia between 2009 and 2016. Diagnosis of CHI (inappropriately high insulin and C-peptide and low Free Fatty Acids (FFA) and 3-betahydroxyl butyrate) and KH (low insulin and C-peptide with elevated FFA, 3-betahydroxybutyrate and normal cortisol during hypoglycemia [glucose <45 mg/dL]) were made based on clinical and biochemical parameters. Patients with CHI who developed KH subsequently were included in the study.

Five children (all boys) developed KH subsequent to resolution of CHI. Baseline characteristics of each child and time interval for development of KH are shown in *Web Table* **I**. The mean (SD) birthweight was 2.82 (0.45) kg and the mean age at the time of initial presentation was 46.8 hours. All patients required higher rates of glucose infusion [13.70 (1.57) mg/kg/min)] with a mean (SD) glucose concentraion of 1.98 (0.72) mmol/L. The biochemcial screen during hypoglycemia confirmed CHI (raised insulin concentration with suppressed FFA and 3- betahydroxyl butyrate). Four children required Diazoxide [7.38 (1.94) mg/kg/day] therapy which was discontinued at a mean (SD) age of 11.2 (5.25) months. KH developed after a mean duration of 6.7 months following resolution of CHI.