

## Role of Routine Preoperative Biochemistry in Anaesthesia

Muhammad Ishaq,<sup>1</sup> Babar Hussain Khan,<sup>2</sup> Sarmad Masud,<sup>3</sup> Rehana S. Kamal,<sup>4</sup> Muhammad Atif Malik<sup>5</sup>

### Abstract

**Objectives:** To assess the value of routine preoperative biochemical tests and their effects on anaesthetic management.

**Design:** A cross sectional study.

**Place and Duration of Study:** Shalamar Hospital, Lahore. From August 1<sup>st</sup> 2009 to November 30<sup>th</sup> 2009.

**Methodology:** We studied consecutive 500 ASA I and ASA II patients, 40 years of age and above, scheduled for elective surgery. Patients with any disease or factor that can lead to metabolic disturbance were excluded from the study.

**Results:** Patients were divided into 4 age groups, (Group A (40 – 49 years), Group B (50 – 59 years), Group C (60 – 69 years) and Group D (more than 70 years). Total abnormalities detected were 8 (1.6%). Abnormal blood sugar was found in 5 cases, 1.1% of all the tested patients, which belonged to age group A (1.7% of the group population). Abnormal blood urea was found in 2 cases which is 0.4% of the tested population and all of these belonged to age group D (2.8% of the age group population). Abnormal creatinine was found in one of the two cases of abnormal blood urea in the age group D, which is 0.2% of the tested population (1.4% of the group population). Serum electrolyte abnormalities were not found in any patient. The anaesthetic management was changed in 5 cases with abnormal blood sugar and was not influenced in patients with abnormal blood urea and serum creatinine.

**Conclusion and Recommendation:** Routine preoperative serum electrolytes in patients, aged 40 – 70 years with no history of cardiac disease, renal disease and diabetes are not recommended. We recommend routine preoperative estimation of blood sugar in the all patients above the age of 40 years and renal function tests in patients above the age of 70 years.

**Key Words:** Routine preoperative blood sugar, Urea, Creatinine, peri and postoperative, anaesthetic management.

---

Ishaq M.<sup>1</sup>

Department of Anaesthesiology  
Shalamar Hospital, Shalimar Link Road, Lahore

Khan B.H.<sup>2</sup>

Consultant ENT Surgeon  
ENT Department, Shalamar Hospital  
Shalimar Link Road, Lahore

Masud S.<sup>3</sup>

Department of Anaesthesiology  
Shalamar Hospital, Shalimar Link Road, Lahore

Kamal R.S.<sup>4</sup>

Department of Anaesthesiology  
Shalamar Hospital, Shalimar Link Road, Lahore

Malik M.A.<sup>5</sup>

Department of Anaesthesiology  
Shalamar Hospital, Shalimar Link Road, Lahore

### Introduction

Most preoperative investigations are carried out as a matter of routine with the hope that both the patient and the surgeon will be benefited.<sup>1</sup> However, in major

ity of cases, these have questionable effect on the anaesthetic management.<sup>2</sup> In a surgical patient, some investigations are carried out as a matter of routine with no direct relationship with the positive findings in the history and clinical examination.<sup>3</sup> These routine investigations do not give any added information about the basic problem of the patient, and have no influence on the anaesthetic management and are wastage of resources.<sup>4</sup>

Routine preoperative tests were defined as those ordered for an asymptomatic, apparently healthy individual to identify a condition undetected by history and clinical examination.<sup>5</sup>

In the 1980s, the practice of routinely ordering preoperative screening tests was questioned.<sup>6</sup> Routine preoperative tests without suspected or known disease in patients yield an extremely low rate of true positive results and may not be beneficial to patients.<sup>7</sup> In fact some routine preoperative screening tests may harm the patient, false positive and borderline positive results may lead to iatrogenic problems or postponement of surgery. The financial conditions in medical practice are also a major factor in motivating physicians to reduce preoperative laboratory tests.<sup>8</sup>

In our setup, pre-operative protocol was to order routine biochemical tests i.e. estimation of blood sugar, serum urea, creatinine and electrolytes in all patients scheduled for elective surgery. These tests are carried out on the basis of suggestions given in standard textbooks.<sup>9</sup> The rationale for this study is to evaluate the significance of routine preoperative biochemical tests, and also to compare these results with those mentioned in the literature so that a better regime for preoperative assessment can be formulated.

## Material and Methods

From August 1<sup>st</sup> 2009 to November 30<sup>th</sup> 2009, a cross-sectional study was conducted. 500 consecutive ASA I and ASA II patients scheduled for elective surgery, 40 years of age and above were included in the study. All Patients with history of any problem which could lead to biochemical disturbances e.g. history of diarrhoea, vomiting, diabetes mellitus, renal, hepatic and endocrine diseases and patients receiving diuretics, anti-hypertensive and steroids medications were excluded from the study. All emergency surgeries and patients with ASA III and above status were also excluded from the study.

The project was approved by the Hospital Ethics Committee and informed consent was taken from all

the participants.

Patients were divided in 4 age groups. Group A (40 – 49 years), Group B (50 – 59 years), Group C (60 – 69 years) and Group D (more than 70 years).

Laboratory investigations which were routinely ordered included random blood sugar in all patients above 40 years of age, serum sodium, potassium, creatinine and blood urea. These investigations were examined a day before surgery by one of the authors. The tests were considered abnormal if random blood sugar was more than 180 mg/dl,<sup>10</sup> serum sodium more than 145 meq/l or less than 130 meq/l, serum potassium more than 5.5 meq/l or less than 3.5 meq/l, blood urea more than 40 mg/dl and serum creatinine more than 1.5 mg/dl. Patients with abnormal biochemical results were referred to medical specialists for further diagnosis and management.

## Results

The study sample consisted of 500 patients 40 years and above and whom biochemical tests were done solely as a matter of routine preoperative procedure. Only one case (0.2%) was dropped from the study whose blood sugar was abnormal due to faulty sampling technique and was not proved to be a diabetic. Demographic data of the patients is shown as Table 1. The mean age of the study sample was 51 years with a range from 40 – 85 years. Majority of cases 375 (75%) belonged to general surgery, while gynaecology, obstetrics, orthopaedics, ENT and urology accounted for the rest one fourth of the cases. Out of 499 cases, abnormalities detected were eight (1.6%). Abnormalities in random blood sugar were five (1.0%) and in blood urea 2 (0.4%). One of the two cases of abnormal blood urea had abnormal serum creatinine (0.2%). There was no abnormality detected in serum electrolytes. All the detected abnormalities were in the age group of 40 – 49 years and in the age of group 70 years and above. Out of 299 cases in the age group of 40 – 49 years, five (1.7%) had random blood sugar abnormalities. The random blood sugar levels were more than 180 mg/dl in these five cases. Out of 70 cases in the age group of 70 years and above, 2 had blood urea (2.8%) and 1 had serum creatinine (1.4%) abnormality (Table 2).

Anaesthetic management was routinely done in all patients except five patients in group A (age 40 – 49 years) whose blood sugar levels were abnormal. These patients were sent to the medical physician who diag-

**Table 1:** Patients demographic Data. Total number of patients 499.

Age Groups in Years				Sex		Types of Surgery	
A 40 – 49 No %	B50 – 59 50 – 59 No %	C60 – 69 60 – 69 No %	D 70 > 70 > No %	M	F	General Surgery	Others
299 (60%)	75 (15%)	55 (11%)	70 (14%)	254 (51%)	245 (49%)	375 (75%)	124 (25%)

**Table 2:** Total Abnormalities Detected and Distribution of Abnormalities in different Age Groups.

	Total Abnormalities detected no. (%)	Blood Sugar no. (%)	Urea no. (%)	Crcatinine no. (%)	Electrolytes no. (%)	Anaesthetic management no. (%)
Abnormalities detected (n = 499)	8 (1.6)	5 (1)	2 (0.4)	1 (.2)	1 (.2)	5 (1)
(Age Group) A 299	-	5 (1.7)	-	-	-	5 (1.7)
B 75	-	-	•	-	1 -	-
C 55	-	-	-	-	-	-
D 70	-	-	2 (2.8)	-	-	-

nosed them as suffering from diabetes mellitus. They were referred back to surgery after control of diabetes mellitus. The preoperative, intraoperative and postoperative blood sugar management was done according to Albert! regimen.<sup>11</sup> The patient with abnormal urea and creatinine level were closely observed for any worsening of renal functions but the anaesthetic management was not changed in these cases.

## Discussion

Little work has been done on the subject in recent years and no consensus exists about carrying out routine preoperative investigations in general and biochemical tests in particular. A clinical examination of the patients is the best – guide for ordering preoperative laboratory testing.<sup>12,13</sup> These tests are not obligatory as a routine preoperative evaluation and can be used selectively on the basis of medical history.<sup>14</sup> However, asymptomatic prevalence of diseases necessitates preoperatively screening tests; to detect those silent diseases which are aggravated in stressful circumstances i.e. the peri-operative period. Screening tests are valu-

able to detect highly prevalent asymptomatic conditions whose preoperative detection is more useful to improve peri and postoperative management of patients.

In one study by Alsumait BM, Alhumood SA, Ivanova T, Mores M, Edeia M. out of 1000 patients approximately 14% of the preoperative tests were abnormal, 9.2% of which was expected while 4.9% was unexpected; however, there was no change in the preoperative care of patients with unexpected abnormalities, nor was there surgical delay or related postoperative complication.<sup>15</sup>

Abnormalities of blood glucose due to diabetes mellitus is one of the conditions for which preoperative screening tests are very useful because this disease is the most prevalent metabolic disorder which remains in sub clinical phase in a significant number of patients.<sup>16,17</sup>

The prevalence of diabetes increases with age. The overall prevalence of diabetes is 4% in Pakistan. WHO ranks Pakistan 7th on diabetes prevalence list published in November 15, 2008. It is 4% between 15 – 24 years of age and 89% at the age of 65 years and

above.<sup>18</sup> The prevalence of type II diabetes mellitus in various populations of the world range from 1.7% in Malta to 25.5% in U.S.A – Pima Indians.<sup>18</sup> The excess risk is due to complications of diabetes mellitus. It was found that more patients with diabetic end organ disease suffered non cardiac perioperative complications compared with those with uncomplicated diabetes.<sup>11</sup> In our study sample, only 5 patients out of 499 (1.0%) who were routinely screened proved to be asymptomatic diabetics. All these patients belonged to age group A (40 – 49 years). These patients were further investigated for complications of diabetic mellitus by doing ECG, urinary protein analysis, renal function tests, and other investigations required for detection of coronary heart diseases, diabetic nephropathy and automatic neuropathy respectively. The Surgeries were postponed in these five patients initially. The surgeries were carried out later on when their blood sugar was controlled and their diabetes was managed according to Albert regimen in the Preoperative, Preoperative and Postoperative period.<sup>6</sup>

Smooth control of diabetes mellitus minimises the risk of infection and balances the catabolic response to anaesthesia and surgery. There is no evidence that diabetic patients with good glycemic control are more prone to infections than normal persons. However poorly controlled diabetics are highly susceptible to skin, lungs and urinary tract infections.

The prevalence and incidence of renal failure are in the rise world wide.<sup>20,21</sup> A wide geographical variation exists in the causes of the CRF. For example the most common cause of glomerulonephritis in Sub Sahara Africa is malaria.<sup>22</sup> Schistosomiasis is a most common cause of renal failure in parts of Middle East.<sup>23,24</sup> The prevalence of diabetic nephropathy is higher in Asians groups than in whites.<sup>23</sup> The age group involved is also of relevance e.g. CRF due to atherosclerotic renal vascular disease is much more common in the elderly than in the young population. We found abnormal renal functions in two out of 499 tested patients which is 0.4% of tested population, all of which belong to age group D (70 and above). Surgery was not postponed in two patients with abnormal renal function tests and was managed according to the renal failure protocol preoperatively and post operatively. The frequency of detection of all these abnormalities was not statistically significant due to small number of patients investigated. As far as serum electrolytes are concerned we did not find any abnormal finding during routine preoperative testing. Moreover disturban-

ces in fluid and electrolytes are always associated with other diseases of GIT, Renal and Endocrine systems.

## Recommendation

1. We recommend routine preoperative screening for diabetes in all the patients above age of 40 years.
2. Routine serum electrolytes and renal function test should be carried out after the age of 70 years.

## References

1. Leshin B; McCalmont TH Preoperative evaluation of the surgical patient. *Dermatol Clin.* 1990; 8 (4): 787-94.
2. Johnson H Jr, Knee – Ioli S, Butler TA, Munoz E, Wise L. Are routine preoperative laboratory screening tests necessary to evaluate ambulatory surgical patients? *Surgery.* 1988 Oct; 104 (4): 639-45.
3. Ramaswamy A, Gonzalez R, Smith CD. *J Gastrointest Surg.* Extensive preoperative testing is not necessary in morbidly obese patients undergoing gastric bypass 2004 Feb; 8 (2): 159-64; discussion 164-5.
4. Johnson RK, Mortimer AJ. Routine pre-operative blood testing: is it necessary? *Anaesthesia.* 2002 Sep; 57 (9): 914-7.
5. ASA practice advisory for preanaesthesia evaluation: *Anesthesiology* 2002; 96 (2): 485-96.
6. Alex Macorip, Micheal !• Ro/an, Ronald A Thisted et al. Reassessment of preoperative laboratory testing has changed the test ordering patterns of physicians. *Surgery, Gynaecology and Obstetrics* 1992; 175: 539-547.
7. Royal College of Radiologists: preoperative chest Radiology. *Lancet* 1979: 83-8.
8. Arieta CE, Nascimento MA, Lira RP, Kara – José N. Waste of medical tests in preoperative evaluation for cataract surgery. *Cad Saude Publica.* 2004 Jan – Feb; 20 (1): 303-10. Epub 2004 Mar 8.
9. AR Aitkenhead, G Smith. Pre-operative laboratory investigations, textbook of anaesthesia 1996: p. 309.
10. G.R MC Anulty, H.J Robertshavv and GM. HALL. Anaesthetic management of patient with diabetes mellitus. *Br. J Anaesth* 2000; 85: 80-90.
11. Albert! KGMM. Diabetes and surgery. *Anesthesiology* 1991; 74: 209-1.
12. Meneghini L, Zadra N, Zanette G, Baiocchi M, Giusti F. The usefulness of routine preoperative laboratory tests for one-day surgery in healthy children. *Paediatr Anaesth.* 1998; 8 (1): 11 – 5 Michael Swash, Hutchison's clinical methods 1995: p. 4.
13. Johnson H Jr, Knee – Ioli S, Butler TA, Munoz E, Wise L. Are routine preoperative laboratory screening tests necessary to evaluate ambulatory surgical patients? *Surgery.* 1988 Oct; 104 (4): 639-45.

14. Robbin JA, Mushlins AL. Preoperative evaluation of the healthy patients. *Med Clin N Am.* 1979; 63: 1145.
15. Ramaswamy A, Gonzalez R, Smith CD. Extensive preoperative testing is not necessary in morbidly obese patients undergoing gastric bypass. *J Gastrointest Surg.* 2004 Feb; 8 (2): 159-64; discussion 164-5.
16. Alsumait BM, Alhumood SA, Ivanova T, Mores M, Edeia M. A prospective evaluation of preoperative screening laboratory tests in general surgery patients. *Med Princ Pract.* 2002 Jan – Mar; 11 (1): 42-5.
17. Shera AS, Rafique G, Khwaja IA, A ra J, Baqai S, King H. Pakistan national diabetes survey: prevalence of glucose intolerance and associated factors in Shikarpur, Sindh Province. *Diabet Med.* 1995 Dec; 12 (12): 1116-21.
18. J. Tuomilehto, A. Nissinen, S. -L. Kivelä, J. Pekkanen, E. Kaarsalo, E. Wolf, A. Aro, S. Punsar and M. J. Karvonens. Prevalence of diabetes mellitus in elderly men aged 65 to 84 years in eastern and western Finland *Diabetologia*, Volume 29, Number 9, 611-615. Pakistan Medical Research Council, National Health Survey for diabetes 2000, pulse international July 15-31, 2000; 1 (15).
19. Josef Coresh, MD, PhD; Elizabeth Selvin, PhD, MPH; Lesley A. Stevens, MD, MS; Jane Manzi, PhD; John W. Kusek, PhD; Paul Eggers, PhD; Frederick Van Lente, PhD; Andrew S. Levey, MD Prevalence of Chronic Kidney Disease in the United States. *JAMA.* 2007; 298 (17): 2038-2047. Fowker FOR, Limn JN, Farrow SC et al. Epidemiology in anaesthesia, mortality risk in patients with coexisting physical disease. *Br J Anaesth* 1982; 54: 819.
20. Sanjay Kumar Agarwal, Suresh Chand Dash, Mohammad Irshad, Sreebhuan Raju, Ravinder Singh and Ravinder Mohan Pandey Prevalence of chronic renal failure in adults in Delhi, India *Nephrol. Dial. Transplant.* (August 2005) 20 (8): 1638-1642. Kumar and Clark. *Clinical Medicine* 1998; p 572.
21. Durlach R, Rodríguez VE, Ezcurra C, Freuler C. Plasmodium falciparum malaria acquired in Sub-Saharan Africa *Medicina (B Aires).* 2009; 69 (1 Pt 2): 163-6.
22. Ziskind B Urinary schistosomiasis in ancient Egypt *Nephrol Ther.* 2009 Dec; 5 (7): 658-61. Epub 2009 Jul 18.
23. Von Lichtenberg F. Schistosomiasis as a worldwide problem: pathology. *J Toxicol Environ Health.* 1975 Nov; 1 (2): 175-84.