

2-1-2003

Clinical Chemistry Laboratory references parameters

V. Wiwanitkit

K. Tangdhanakanond

Follow this and additional works at: <https://digital.car.chula.ac.th/clmjjournal>



Part of the [Medicine and Health Sciences Commons](#)

Recommended Citation

Wiwanitkit, V. and Tangdhanakanond, K. (2003) "Clinical Chemistry Laboratory references parameters," *Chulalongkorn Medical Journal*: Vol. 47: Iss. 2, Article 4.

Available at: <https://digital.car.chula.ac.th/clmjjournal/vol47/iss2/4>

This Article is brought to you for free and open access by the Chulalongkorn Journal Online (CUJO) at Chula Digital Collections. It has been accepted for inclusion in Chulalongkorn Medical Journal by an authorized editor of Chula Digital Collections. For more information, please contact ChulaDC@car.chula.ac.th.

Clinical Chemistry Laboratory references parameters

Viroj Wiwanitkit*

Kawin Tangdhanakanond*

Wiwanitkit V, Tangdhanakanond K. Clinical Chemistry Laboratory references parameters.
Chula Med J 2003 Feb; 47(2): 97 - 100

- Objective** : *To set up new Clinical Chemistry Laboratory test reference parameters for the Thai Population in Bangkok*
- Study Design** : *A descriptive study*
- Subjects** : *712 normal subjects of both sex attending the annual routine check up program of King Chulalongkorn Memorial Hospital*
- Method** : *Blood specimens from each subject were collected using an evacuated blood collection system. Nine important clinical chemistry parameters including BUN, Creatine, glucose, uric acid, cholesterol, triglyceride, SGOT, SGPT, ALP were analyzed using an automated clinical chemistry analyzer. Reference ranges were calculated.*
- Results** : *The reference value of each parameter was set and is described in this article.*
- Conclusion** : *Reference value setting is necessary and should be performed in each new laboratory setting*
- Key words** : *Clinical chemistry, Reference.*

Reprint request: Wiwanitkit V, Department of Laboratory Medicine, Faculty of Medicine,
Chulalongkorn University, Bangkok 10330, Thailand.

Received for publication. December 15, 2002.

วารสาร ใววนิชกัจ, กวึน ตังชนกานนท. ค่ำอ้างอิงสำหรับการตรวจทางเคมีคลินิก. จุฬาลงกรณ์-
เวชสาร 2546 ก.พ.;47(2): 97 - 100

- วัตถุประสงค์** : ทำการศึกษาค่าอ้างอิงสำหรับการตรวจทางเคมีคลินิกในกลุ่มคนไทย
- รูปแบบการศึกษา** : การศึกษาเชิงพรรณนา
- ตัวอย่างที่ทำการศึกษา** : ตัวอย่างชาวไทยจำนวน 712 ที่ได้รับการตรวจสุขภาพจากโรงพยาบาล
จุฬาลงกรณ์
- วิธีการศึกษา** : ทำการเก็บตัวอย่างเลือดจากตัวอย่างแต่ละคน แล้วนำมาวิเคราะห์ทาง
เคมีคลินิกด้วยเครื่องวิเคราะห์อัตโนมัติเพื่อหาระดับสารเคมีที่สำคัญ
9 ชนิด คือ BUN, Creatine, glucose, uric acid, cholesterol, triglyceride,
SGOT, SGPT, ALP นำผลที่ได้มาคำนวณหาค่าอ้างอิงต่อไป
- ผลการศึกษา** : ได้ค่าอ้างอิงสำหรับสารเคมีแต่ละชนิดและแสดงไว้ในรายงาน
- บทสรุป** : การหาค่าอ้างอิงเป็นสิ่งที่มีความจำเป็นและควรจัดทำในห้องปฏิบัติการ
การทางการแพทย์ทุกแห่ง
- คำสำคัญ** : เคมีคลินิก, ค่าอ้างอิง

Clinical blood chemistry testing is a common laboratory request in the present day.⁽¹⁻²⁾ It is recommended in the annual routine check up for the Thai population. In to the pathogenesis of many diseases, before clinical symptoms can be detected, abnormalities in laboratory results can be shown.⁽³⁾

In interpretation of any clinical chemistry laboratory test, reference ranges are necessary.⁽³⁻⁴⁾ Due to the fact that the reference values of each laboratory test vary with geographical distribution, it is necessary to set the laboratory reference ranges according to each new area. From literature review, there are only a few reports of clinical chemistry tests reference ranges among the Thai and no recent report was found. In this study, the clinical chemistry reference ranges among the Thais are established.

Material and method

This was designed as a descriptive study. A total of 712 normal subjects of both sex attending the annual routine check up program of King Chulalongkorn Memorial Hospital were included. In the case of any

abnormalities being detected by the physician during physical examination, the patient was excluded.

Each subject was performed antecubital venipuncture using evacuated blood collection system. All subjects were informed to fast for 12-hour period before getting blood collection. Blood specimens from each subject were collected using an evacuated blood collection system. The studied clinical chemistry test parameters consisted of blood urea nitrogen (BUN), creatinine (Cr), glucose, uric acid, cholesterol, triglyceride, SGOT, SGPT and ALP. Each sample was enzymatic calorimetric tested by an automated clinical chemistry analyzer, (Hitachi).

The result from each subject was recorded in tabular form and all results assembled and analyzed. The average and standard deviation (SD) was calculated for each parameter. The reference range for each parameter was set at average \pm 2 SD.⁽⁵⁾

Result

The average, standard deviation and reference ranges for each parameter are shown in Table 1.

Table 1. Average, standard deviation and reference range for each parameter.

Parameters	Average	Standard deviation	Reference range
BUN (mg/dl)	11.90	3.20	5.51 - 18.29
Creatinine (mg/dl)	0.92	0.16	0.59 - 1.24
Glucose (mg/dl)	92.20	18.04	56.12 - 128.28
Uric acid (mg/dl)	5.23	1.65	1.93 - 8.51
Cholesterol (mg/dl)	225.89	41.59	142.72 - 309.06
Triglyceride (mg/dl)	111.68	67.78	0 - 247.24
SGOT (IU/l)	23.73	13.19	0 - 50.11
SGPT (IU/l)	25.11	19.01	0 - 63.12
ALP (IU/l)	163.55	49.87	63.81 - 263.29

Discussion

Reference value determination for each new laboratory setting is important due to the variability of normal values in each area. In this study, reference values for clinical chemistry tests parameters for the Thais were set.

These present reference values are from automated techniques derived in which are the most frequently used. The old reference values in use in many laboratories are derived from manual methods or obtained from the manufacturer's recommendations.

Comparing our reference values to the general reference values, a close similarity can be observed. One observation in our reference values is the rather high reference values of SGOT and SGPT. This may imply the importance of latent liver abnormalities among the Thai population.

The studied parameters in this report are common clinical chemistry tests, which are usually included in a routine check up. Therefore, they may be a useful tool for the physician in interpretation of the patient's laboratory results.

The authors recommend that every laboratory should calculate their own reference values, as this is one of the concepts for standardization of the laboratory setting.⁽⁶⁻⁷⁾ In Thailand, this type of study is limited, therefore, it should be promoted. Furthermore, future studies to establish reference values among

specific patient groups such as the pregnant, infants, children and the elderly is suggested.

References

1. Wiwanitkit V. Errors in laboratory requests in the In-Patient Department, King Chulalongkorn Memorial Hospital. *Chula Med J* 1998 Sep; 42(9): 685 - 93
2. Wiwanitkit V. Aspects about blood tests in a private clinic setting. *Bull Lampang Hosp* 1999 Sep - Dec; 20(3): 120 - 3
3. Wiwanitkit V. Abnormal laboratory results as presentation in screening test. *Chula Med J* 1998 Dec; 42(12): 1059 - 67
4. Wiwanitkit V. Rationalization and compliance in laboratory investigation. *Chula Med J* 1999 Jun; 43(6): 353 - 60
5. Solberg EK. Statistical treatment of collected reference values and determination of reference limits. In: Grasbeck R, Alstrom W, eds. *Reference Values In Laboratory Medicine*. Chichester: John Wiley, 1981.
6. Wiwanitkit V. ISO 9000 quality system in laboratory medicine. *Med J Ubon Hosp* 1999 Oct - Dec; 20(4): 217 - 25
7. Wiwanitkit V. ISO 14000 quality system in laboratory medicine. *Bull Lampang Hosp* 2000 Jan - Apr; 21(1): 62 - 6