

Short Communication

Investigation on the Bilirubin Levels of Male and Female Jaundice Patients

R. Manimegala¹ and A. Jayaprakash^{2*}

¹Postgraduate Diploma in Medical Laboratory Technology; ²PG & Research Department of Biochemistry, Sacred Heart College (Autonomous), Tirupattur-635 601, Tamil Nadu, India
aruljaypee@gmail.com*; +91 9841378323

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Abstract

This study investigated on the bilirubin levels of male and female jaundice patients. Bilirubin levels (Total, Direct and Indirect Bilirubin) were analyzed using the standard methods. The present study showed that the total bilirubin, direct and indirect bilirubin levels were found to be normal in male and female patients. It was found that male aged 22 years had high total bilirubin levels compared to direct and indirect bilirubin. It was found that female aged 38 years had high total bilirubin levels compared to direct and indirect bilirubin. The bilirubin level can be elevated for a number of reasons, including liver failure which happens when the liver is no longer able to transform unconjugated bilirubin to conjugated bilirubin and excreted through stool. Unconjugated bilirubin accumulates in the body, giving patients with liver failure. Hemolytic anemia is characterized by the rapid loss of red blood cells in certain patients. As a result, their body has the inability to keep up with the breakdown, the patient becomes jaundiced.

Keywords: Bilirubin, jaundice, liver failure, conjugated bilirubin, hemolytic anemia.

Introduction

Bile contains bilirubin, which is a yellow/brown substance. It's a waste product created when red blood cells break down. Until being released from the body, bilirubin is stored in the liver (Adachi and Fukumoto, 1996). It is gradually expelled from the body by feces and brown colour of the stool is mainly due to this. Unconjugated and conjugated bilirubin is the two forms of bilirubin present in the body (Diamond, 1970). One can deduce the primary problem that may cause elevated bilirubin levels. Indirect or unconjugated bilirubin is the remainder of haemoglobin which is transformed to unconjugated haemoglobin when the heme is released during RBC breakdown. Bilirubin of this type flows from the bloodstream to the liver and this molecule is not soluble in water (Jangi *et al.*, 2013). Bilirubin is converted to conjugated bilirubin in the liver from unconjugated bilirubin. As sugar binds to unconjugated bilirubin, this occurs. Bile is formed when unconjugated bilirubin reaches the small intestine. It is ultimately excreted in a person's feces and this molecule is soluble in water. Considering the above facts in view, this study evaluated the bilirubin levels among male and female patients with the help of Liver Function Test with the following objectives:

- To collect the patient serum samples from Kauvery Hospital, Hosur, Krishnagiri District, Tamil Nadu.

- To analyze Bilirubin levels (Total, Direct and Indirect Bilirubin).
- To categorize the bilirubin levels based upon gender among the studied patients and interpretation of the data using normal values.

Materials and methods

Specimen collection: The blood sample of the patients (N=60) has been collected from the Kauvery Hospital, Hosur and the sample was centrifuged to get the serum for Bilirubin tests.

Estimation-Malloy and Evelyn (1937) method: This method for bilirubin estimation is based on Van Den Bergh reaction. In this reaction, bilirubin reacts with diazotized sulfanilic acid to produce azobilirubin which is purple in color. Intensity of color is directly proportional to the amount of bilirubin in the serum. There are two kinds of reactions- direct reaction and indirect reaction. The direct reaction occurs in aqueous medium and is given by only water-soluble conjugated bilirubin. The reaction is fast and color develops in first few minutes only. That is why; conjugated bilirubin is also called direct bilirubin. In indirect reaction, methyl alcohol is added which solubilizes unconjugated, water insoluble bilirubin. Hence, indirect reaction gives the measure of total bilirubin (conjugated and unconjugated).

*Corresponding author

Unconjugated bilirubin = total bilirubin- conjugated bilirubin

In this way, unconjugated bilirubin can be calculated after indirect reaction. Also, unconjugated bilirubin is called indirect bilirubin. Concentration of bilirubin (serum sample/test) = OD (test)/OD(standard) X Concentration of standard X 100 mg/dL.

Normal value:

- Total bilirubin : 0.2-1.0 mg/dL
- Conjugated bilirubin : 0.1-0.4 mg/dL
- Unconjugated bilirubin : 0.2-0.7mg/dL

Results and discussion

Table 1 shows the total bilirubin, direct and indirect bilirubin levels of male patients. It was found that male aged 22 years had high total bilirubin levels compared to direct and indirect bilirubin. Table 2 shows the total bilirubin, direct and indirect bilirubin levels of female patients. It was found that female aged 38 years had high total bilirubin levels compared to direct and indirect bilirubin. The bilirubin level can be elevated for a number of reasons, including liver failure which happens when the liver is no longer able to transform unconjugated bilirubin to conjugated bilirubin and excreted through stool. Unconjugated bilirubin accumulates in the body, giving patients with liver failure. Hemolytic anemia is characterized by the rapid loss of red blood cells in certain patients. As a result, their body has the inability to keep up with the breakdown, the patient becomes jaundiced (Kwak et al., 1991). During bile duct obstruction, bilirubin is unable to be excreted by bile into the small intestine, resulting in a rise in its amount as a result of the physical obstruction. Hemolytic or pernicious anemia, transfusion reactions, and cirrhosis can cause unconjugated bilirubin levels to be higher than conjugated bilirubin levels (Stocker et al., 1987). If conjugated bilirubin levels are higher than unconjugated bilirubin levels, it results in liver disease. If the conjugated bilirubin levels are higher than the unconjugated bilirubin levels, the liver cells are most likely failing to conjugate the bilirubin. Drug reactions, hepatitis, and any form of liver disease are common causes. This can also be seen if the bile ducts are blocked in any way. Gallstones, cancers, and bile duct scarring are also potential causes.

Conclusion

The present study showed that the total bilirubin, direct and indirect bilirubin levels were found to be normal in male and female patients. It was found that male aged 22 years had high total bilirubin levels compared to direct and indirect bilirubin. It was found that female aged 38 years had high total bilirubin levels compared to direct and indirect bilirubin.

Table 1. Bilirubin levels of male patients.

| S.No. | Age (Years) | Total Bilirubin (mg/dL) | Direct Bilirubin (mg/dL) | Indirect Bilirubin (mg/dL) |
|-------|-------------|-------------------------|--------------------------|----------------------------|
| 1. | 21 | 0.7 | 0.1 | 0.3 |
| 2. | 22 | 0.6 | 0.1 | 0.5 |
| 3. | 22 | 28.8 | 0.2 | 0.3 |
| 4. | 24 | 0.6 | 0.3 | 0.3 |
| 5. | 27 | 0.6 | 0.1 | 0.5 |
| 6. | 30 | 1.5 | 0.7 | 0.8 |
| 7. | 32 | 0.5 | 0.4 | 0.6 |
| 8. | 32 | 0.3 | 0.1 | 0.2 |
| 9. | 33 | 0.9 | 0.2 | 0.7 |
| 10. | 34 | 0.4 | 0.1 | 0.6 |
| 11. | 35 | 8.3 | 7.0 | 0.1 |
| 12. | 38 | 0.7 | 0.1 | 0.6 |
| 13. | 38 | 1.4 | 0.6 | 0.8 |
| 14. | 38 | 1.0 | 0.2 | 0.8 |
| 15. | 38 | 0.5 | 0.1 | 0.4 |
| 16. | 38 | 0.9 | 0.2 | 0.7 |
| 17. | 39 | 0.3 | 0.1 | 0.2 |
| 18. | 39 | 0.9 | 0.2 | 0.5 |
| 19. | 40 | 0.4 | 0.1 | 0.3 |
| 20. | 41 | 2.4 | 2.0 | 0.4 |
| 21. | 42 | 0.9 | 0.3 | 0.6 |
| 22. | 43 | 0.6 | 0.2 | 0.5 |
| 23. | 44 | 0.3 | 0.1 | 0.2 |
| 24. | 44 | 0.3 | 0.1 | 0.2 |
| 25. | 45 | 0.6 | 0.1 | 0.5 |
| 26. | 45 | 0.8 | 0.2 | 0.6 |
| 27. | 46 | 0.6 | 0.2 | 0.5 |
| 28. | 46 | 0.3 | 0.1 | 0.2 |
| 29. | 46 | 0.7 | 0.2 | 0.5 |
| 30. | 47 | 0.6 | 0.2 | 0.7 |
| 31. | 48 | 0.9 | 0.6 | 0.6 |
| 32. | 49 | 1.0 | 0.3 | 0.7 |
| 33. | 50 | 3.0 | 0.9 | 2.1 |
| 34. | 55 | 0.7 | 0.6 | 0.5 |
| 35. | 55 | 8.3 | 0.3 | 0.2 |

The bilirubin level can be elevated for a number of reasons, including liver failure which happens when the liver is no longer able to transform unconjugated bilirubin to conjugated bilirubin and excreted through stool. Unconjugated bilirubin accumulates in the body, giving patients with liver failure. Hemolytic anemia is characterized by the rapid loss of red blood cells in certain patients. As a result, their body has the inability to keep up with the breakdown, the patient becomes jaundiced.

*Corresponding author

Table 2. Bilirubin levels of female patients.

| S.No. | Age (Years) | Total Bilirubin (mg/dL) | Direct Bilirubin (mg/dL) | Indirect Bilirubin (mg/dL) |
|-------|-------------|-------------------------|--------------------------|----------------------------|
| 1. | 21 | 0.6 | 0.1 | 0.5 |
| 2. | 21 | 0.7 | 0.2 | 0.5 |
| 3. | 22 | 8.3 | 7.0 | 1.3 |
| 4. | 22 | 0.7 | 0.2 | 0.5 |
| 5. | 23 | 0.4 | 0.1 | 0.3 |
| 6. | 25 | 0.4 | 0.1 | 0.3 |
| 7. | 26 | 1.2 | 0.2 | 0.1 |
| 8. | 26 | 0.9 | 0.4 | 0.5 |
| 9. | 31 | 0.6 | 0.1 | 0.5 |
| 10. | 32 | 0.4 | 0.1 | 0.3 |
| 11. | 38 | 28.8 | 2.8 | 7.0 |
| 12. | 42 | 2.6 | 2.1 | 0.5 |
| 13. | 42 | 0.5 | 0.1 | 0.2 |
| 14. | 42 | 0.3 | 0.1 | 0.2 |
| 15. | 45 | 0.3 | 0.1 | 0.2 |
| 16. | 45 | 0.3 | 0.1 | 0.2 |
| 17. | 46 | 0.6 | 0.1 | 0.5 |
| 18. | 46 | 1.6 | 0.6 | 1.0 |
| 19. | 46 | 1.6 | 0.6 | 1.0 |
| 20. | 48 | 0.7 | 0.1 | 0.6 |
| 21. | 48 | 4.6 | 3.0 | 1.6 |
| 22. | 50 | 0.6 | 0.2 | 0.4 |
| 23. | 55 | 0.6 | 0.2 | 1.1 |
| 24. | 55 | 0.5 | 0.3 | 0.2 |
| 25. | 64 | 0.9 | 0.4 | 0.5 |

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