

quality of light, color of the room, or clothing worn by the child. The presence of cyanosis may not accurately reflect arterial hypoxemia because both oxygen saturation and the amount of circulating hemoglobin are involved. Children with severe anemia may not be cyanotic despite severe hypoxemia because the hemoglobin level may be too low to produce the characteristic blue color. Conversely, patients with polycythemia may appear cyanotic despite a near-normal  $\text{PaO}_2$ . Heart defects that cause hypoxemia and cyanosis result from desaturated venous blood (blue blood) entering the systemic circulation without passing through the lungs.

## Clinical Manifestations

Over time, two physiologic changes occur in the body in response to chronic hypoxemia: polycythemia and clubbing. **Polycythemia**, an increased number of red blood cells, increases the oxygen-carrying capacity of the blood. However, anemia may result if iron is not readily available for the formation of hemoglobin.

Polycythemia increases the viscosity of the blood and crowds out clotting factors. **Clubbing**, a thickening and flattening of the tips of the fingers and toes, is thought to occur because of chronic tissue hypoxemia and polycythemia ([Fig. 23-8](#)). Infants with mild hypoxemia may be asymptomatic except for cyanosis and exhibit near-normal growth and development. Those with more severe hypoxemia may exhibit fatigue with feeding, poor weight gain, tachypnea, and dyspnea. Severe hypoxemia resulting in tissue hypoxia is manifested by clinical deterioration and signs of poor perfusion.