Purwarupa dan Uji Laboratorium Low-Cost Mini Radiant Infant Warmer = Prototype and Laboratory Test of Low-Cost Mini Radiant Infant Warmer

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Abstrak

Radiant infant warmer adalah perangkat medis yang menjaga bayi tetap hangat sekaligus memungkinkan intervensi medis tanpa mengganggu akses tenaga medis. Perangkat di pasaran umumnya membutuhkan daya minimal 700 Watt, berat 120 kg, dan harga sekitar Rp 40 juta. Studi ini bertujuan mengembangkan prototipe radiant infant warmer yang lebih murah, ringan, dan mampu menjaga suhu bayi dalam rentang 35-36ºC. Prototipe dibuat menggunakan material kayu multiplex dan dikendalikan mikrokontroler yang mengatur daya lampu pemanas berdasarkan sensor DS18B20. Pengujian dilakukan pada suhu ambient 26ºC dan kelembapan 62%, menggunakan lampu PX Infrared 100 Watt dan PX Spot Beam 60 Watt. Lampu dipasang pada reflektor downlight 130 mm. Hasil menunjukkan lampu PX Infrared mencapai suhu 35ºC di titik tengah dalam 2 menit 50 detik dengan daya awal 101,5 Watt, lalu mencapai kondisi tunak pada rata-rata 35,41ºC dengan daya 36,5 Watt. Lampu PX Spot Beam membutuhkan waktu 11 menit 25 detik, dengan untuk mencapai kondisi tunak dengan rata-rata temperatur 35,71ºC dengan daya 57,5 Watt. Distribusi panas lebih merata pada Spot Beam, sedangkan Infrared lebih cepat memanaskan. Prototipe ini berhasil dibuat dengan biaya Rp 2.344.150.

.....A radiant infant warmer is a medical device designed to keep infants warm while allowing medical interventions without obstructing access for healthcare providers. Commercial devices typically require a minimum of 700 watts of power, weigh 120 kg, and cost around Rp 40 million. This study aims to develop a prototype of a radiant infant warmer that is more affordable, lightweight, and capable of maintaining an infant’s temperature within the range of 35–36°C. The prototype was constructed using multiplex wood materials and controlled by a microcontroller that adjusts the heater lamp's power based on DS18B20 sensor readings. Testing was conducted at an ambient temperature of 26°C and 62% humidity, utilizing a 100-watt PX Infrared lamp and a 60-watt PX Spot Beam lamp. The lamps were mounted on a 130 mm downlight reflector. Results showed that the PX Infrared lamp reached 35°C at the center point in 2 minutes and 50 seconds with an initial power of 101.5 watts, then hold steady at an average temperature of 35.41°C with a power of 36.5 watts. The PX Spot Beam lamp required 11 minutes and 25 seconds to get steady at averaging temperature 35.71°C with a power of 57.5 watts. The Spot Beam provided more uniform heat distribution, while the Infrared lamp heated faster. The prototype was successfully built at a cost of Rp 2,344,150.