

Prosthetic Biomechanical Analysis Report

Prothexa AI Clinical Mobility Platform

Patient Name: Sai Kumar

Date: 2026-02-17

Age: 29

Report ID: PBAR-004902

Patient Clinical Profile

Parameter	Value
Gender	male
Height	172.0 cm
Weight	68.0 kg
BMI	22.99
Blood Pressure	118/76 mmHg
Blood Sugar	92 mg/dL
Existing Conditions	None

Gait Metrics Summary

Metric	Value	Interpretation
Step Length	45.0 cm	Normal
Cadence	95.0 spm	Normal
Walking Speed	1.1 m/s	Optimal
Gait Symmetry	0.92	Excellent
Skin Temp	33.8 °C	Stable
Pressure Distribution	0.88	Balanced
Skin Moisture	55.0 %	Low Risk

Risk Classification

Factor	Status
Gait Abnormality	Normal

Skin Irritation Risk	Low
Prosthetic Health Score	96.8/100
Overall Clinical Risk	Low

AI Clinical Interpretation & Recommendations

Clinical Biomechanical Report

To: Attending Physician/Physical Therapist

From: Prosthetic Biomechanics Department

Subject: Gait Analysis and Residual Limb Interface Evaluation

1. Biomechanical Assessment

The patient demonstrates a walking speed of 1.10 m/s, which classifies him as a functional community ambulator (K3/K4 level potential). A step length of 45.0 cm combined with a cadence of 95.0 spm indicates a relatively efficient, albeit slightly shortened, gait cycle compared to normative data for an adult male.

The **Gait Symmetry Index of 0.92** reveals a minor deviation from ideal temporal-spatial symmetry. This 8% variance suggests a slight compensatory reliance on the contralateral (sound) limb, likely characterized by a reduced stance phase on the prosthetic side. While this is within a manageable range for many prosthetic users, persistent asymmetry at this level can lead to secondary joint degeneration in the sound limb over long-term use.

2. Systemic Health Influence

The patient's systemic profile is remarkably stable, providing an optimal foundation for prosthetic rehabilitation:

- * **BMI (22.99):** Falling within the healthy range, the patient's BMI minimizes excessive vertical ground reaction forces. This reduces the mechanical demand on both the prosthetic components and the musculoskeletal structure of the residual limb.

- * **Blood Pressure (118/76) & Blood Sugar (92 mg/dL):** These metrics indicate excellent cardiovascular and metabolic health. Normal glycemic levels and normotension suggest a low risk for peripheral vascular disease or diabetic neuropathy, which are common inhibitors of limb volume stability and wound healing. This systemic stability ensures consistent socket fit throughout the day, as fluctuations in fluid retention (edema) are likely minimal.

3. Socket Load Interpretation

The **Pressure Distribution Index of 0.88** is the most significant clinical finding in this profile. This value indicates a lack of uniform load distribution across the residual limb interface.

- * **Load Asymmetry:** A score of 0.88 suggests the presence of "hot spots" or localized pressure concentrations, likely at the distal end of the residuum or over bony prominences (e.g., the fibular head or tibial crest).

- * **Microclimate Interaction:** The **Skin Moisture (55.0%)** and **Skin Temperature (33.8 °C)** are currently stable, but the moisture level is trending toward the upper threshold of the comfort zone. When combined with uneven pressure distribution (0.88), elevated moisture increases the coefficient of friction at the skin-liner interface. This synergy poses a risk for shear-induced skin breakdown or follicular irritation in areas of high pressure.

4. Clinical Recommendations

Based on the objective data, the following interventions are recommended:

- * **Prosthetic Alignment Review:** A dynamic alignment assessment is required to address the 0.88

pressure distribution. Specifically, the prosthetist should evaluate the socket tilt and toe-out angle to redistribute load more equitably across the patellar tendon or total surface bearing areas.

* **Gait Training:** Focused physical therapy to improve prosthetic weight-bearing confidence. The goal is to bring Gait Symmetry closer to 0.95+ by lengthening the prosthetic stance phase and improving pelvic rotation.

* **Integumentary Management:** Given the 55% moisture levels, the patient should be advised on strict hygiene protocols. Consider the use of specialized prosthetic antiperspirants or a change in liner material (e.g., moving to a perforated liner or a different gel composition) if moisture increases during higher activity levels.

* **Monitoring:** Continued weekly monitoring of symmetry and pressure metrics to ensure that alignment changes correlate with improved biomechanical efficiency.

Conclusion: The patient is a high-functioning user with excellent systemic health. The primary clinical focus should be the refinement of the socket-limb interface to resolve the observed pressure imbalances and prevent long-term soft tissue complications.

This AI-generated report is for information purposes only and does not replace professional medical consultation.