

Awareness of use of foot orthosis among people with diabetic foot complication in Bangladesh

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Abstract

Background: Diabetic foot complications are a major cause of disability, reduced mobility, and diminished quality of life among people with diabetes. Foot orthoses play an important role in preventing and managing diabetic foot complications by reducing plantar pressure, improving stability, and minimizing the risk of ulceration and amputation. However, awareness and utilization of foot orthoses remain poorly understood in Bangladesh. To assess awareness of foot orthosis and examine its association with orthosis use among individuals with diabetic foot complications in Bangladesh.

Methods: A cross-sectional study was conducted among 100 individuals with diabetic foot complications recruited from healthcare facilities in Dhaka, Bangladesh. Data were collected using a structured questionnaire assessing knowledge, perception, self-efficacy, behavior, and use of foot orthosis. Descriptive statistics, Chi-square tests, Mann-Whitney U tests, and correlation analyses were performed to examine relationships between awareness, orthosis use, and selected demographic and clinical variables.

Results: Overall awareness of foot orthosis was low, with 92% of participants classified as having low awareness and none demonstrating high awareness. Knowledge regarding foot orthosis was particularly limited, with 78% of participants reporting low knowledge levels. Despite this, participants demonstrated positive perceptions regarding diabetic foot risks and the benefits of foot orthosis (91% and 100%, respectively), and most reported high self-efficacy (87%). Awareness was significantly associated with educational attainment ($p = .001$) and self-efficacy ($p = .049$). A significant association was observed between awareness and foot orthosis use ($\chi^2 = 53.06$, $p < .001$). Furthermore, participants who used foot orthoses demonstrated significantly higher awareness scores than non-users (Mann-Whitney U = 10.00, $p < .001$).

Conclusion: Awareness of foot orthosis among individuals with diabetic foot complications in Bangladesh is considerably low despite positive perceptions and self-efficacy related to foot care. Greater awareness was associated with increased orthosis utilization, highlighting the importance of patient education and counseling. Targeted awareness programmes, improved access to orthotic services, and integration of foot orthosis education into diabetic foot care may enhance preventive practices and reduce the burden of diabetic foot complications.

Keywords: Diabetes Mellitus; Diabetic Foot; Foot Orthosis; Awareness; Orthotic Devices; Foot Care; Bangladesh

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1. Introduction

Diabetes mellitus (DM) is a chronic metabolic disease with constant hyperglycemia, which is caused by a defect in insulin secretion, insulin action or a combination of both (1). It is one of the most important public health problems facing the world today and linked to high morbidity, mortality, and healthcare costs (1,4). In 2021, the International Diabetes Federation estimated that there were around 537 million people with diabetes in the world aged 20-79 years, almost three-quarters of whom lived in low- and middle-income countries (4). South-East Asia is estimated to account for a significant proportion of the diabetes burden and diabetes prevalence is increasing at a rapid rate in Bangladesh (5,6).

Diabetic foot disorders are some of the most debilitating complications associated with diabetes (9). Peripheral neuropathy, peripheral vascular disease, foot ulceration and lower-limb amputation are significant factors that reduce mobility, quality of life, and health-care costs (8,9). A key unmet healthcare need, therefore, is the prevention and management of diabetic foot complications (9).

Foot orthoses, or shoe inserts, such as custom insoles, therapeutic footwear, and ankle-foot orthoses are very common recommendations for comprehensive diabetic foot management (7,9). The devices redistribute plantar pressure, minimize friction or shear forces, increase stability, provide comfort and lower the likelihood of ulcer reoccurrence and lower limb amputation (7,9). A few previous studies have shown that proper orthotic therapy can enhance functional mobility, and help to prevent ulcers in people with diabetic foot complications (7,9).

Although foot orthoses are known to have benefits, they are not commonly known and used in many low-resource areas (10,12). In Bangladesh, there is a lack of knowledge on diabetic footwear and foot orthoses and many people with diabetes still follow unsafe foot practices (10). Underutilization of orthotic interventions may be due to limited patient education, limited access to rehabilitation services and lack of awareness about preventive foot care (10,12).

Awareness is a multidimensional concept that includes knowledge, perception, attitude, self-efficacy and behavior regarding health practices (12). An increase in awareness has been linked to an increase in adherence to preventive foot-care behaviors, and a decrease in risk of diabetic foot complications (12). But, the level of awareness of the foot orthosis and the correlation of foot orthosis use with diabetic foot complications is unknown in the context of Bangladesh (10).

Innovative technologies used in orthotics, such as pressure-relieving insole, smart orthotic systems, and tailored orthotic interventions in footwear have been identified as key to preventing diabetic foot ulcers and enhancing functional outcomes, in recent developments in diabetic foot management (13,14). However, the technologies have not yet been widely adopted in clinical practice, especially in less developed regions where there is limited awareness and access (13,14).

The objective of this study was to evaluate the knowledge about foot orthoses and to explore the relationship between the knowledge and use of orthosis among individuals who had developed diabetic foot complications in Bangladesh. Knowing patients' awareness and utilization patterns will assist to develop educational and rehabilitation strategies that will enhance diabetic foot care outcomes (9,10,12).

2. Material and Methods

2.1. Study Design and Setting

A cross-sectional study was conducted among individuals with diabetic foot complications at BIHS General Hospital and Diabetic Health Care, Dhaka, Bangladesh, over a nine-month period from May 2025 to January 2026.

2.2. Participants

A total of 100 adults with diabetic foot complications were recruited using a probability sampling technique. Eligible participants were aged 18 years or older, had a diagnosis of diabetic foot complications (including scars, wounds, neuropathy, ulcers, or infections), were able to communicate in either Bengali or English, and provided informed consent to participate. Individuals who had undergone major surgery within the previous three months, were younger than 18 years of age, were not diagnosed with diabetes, or were unable to provide informed consent were excluded from the study.

2.3. Data Collection

Data were collected using a self-developed structured questionnaire. The questionnaire comprised four sections: demographic characteristics, diabetes-related information, diabetic foot complications, and awareness and utilization of foot orthoses. Prior permission was obtained from the participating healthcare facilities before data collection commenced.

2.4. Data Analysis

Data were entered and analyzed using the Statistical Package for the Social Sciences (SPSS), version 25. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize participant characteristics and study variables. Findings were presented using tables, bar charts, and pie charts.

2.5. Ethical Considerations

Ethical approval was obtained from the Institutional Review Board of Bangladesh Health Professions Institute (BHPI) (Reference No. CRP-BHPI/IRB/09/2025/1147). Administrative permission was granted by BIHS General Hospital and Diabetic Health Care prior to data collection. All participants received an information sheet explaining the study objectives and procedures and provided written informed consent before participation. Participants were informed of their right to withdraw from the study at any stage without any consequences. Confidentiality and anonymity were maintained throughout the research process.

3. Results

A total of 100 individuals with diabetic foot complications participated in the study. Figure 1 presents the demographic and clinical characteristics of the participants. The largest proportion of participants belonged to the 51–60 years age group (42.0%), followed by 41–50 years (31.0%), while only 12.0% were aged 30–40 years. Female participants constituted 58.0% of the sample.

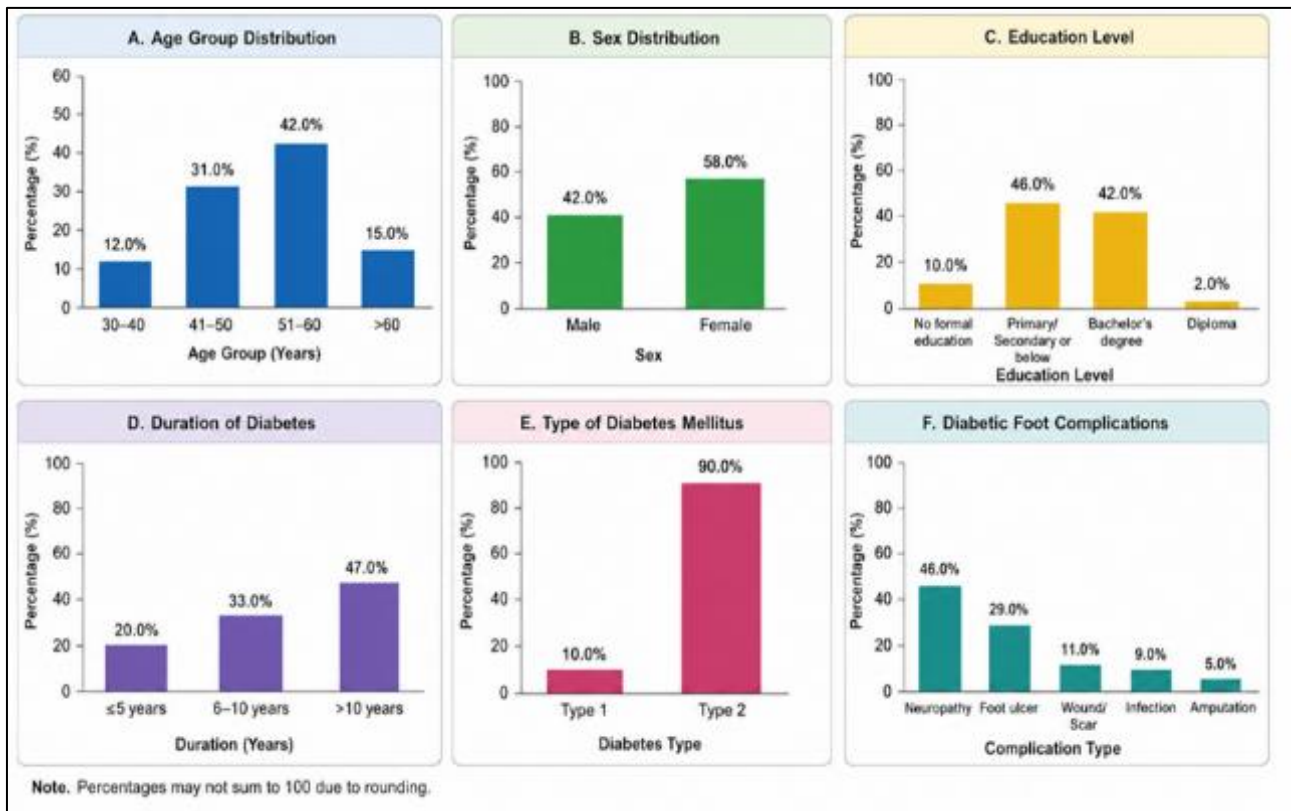


Figure 1 Participant Characteristics (N=100)

Regarding educational attainment, 46.0% had secondary-level education or below, 42.0% had completed a bachelor's degree, 10.0% had no formal education, and 2.0% held a diploma qualification. Nearly half of the participants (47.0%)

had been living with diabetes for more than 10 years. The majority were diagnosed with Type 2 diabetes mellitus (90.0%). Neuropathy was the most frequently reported diabetic foot complication (46.0%), followed by foot ulcer (29.0%), wound or scar (11.0%), infection (9.0%), and amputation (5.0%).

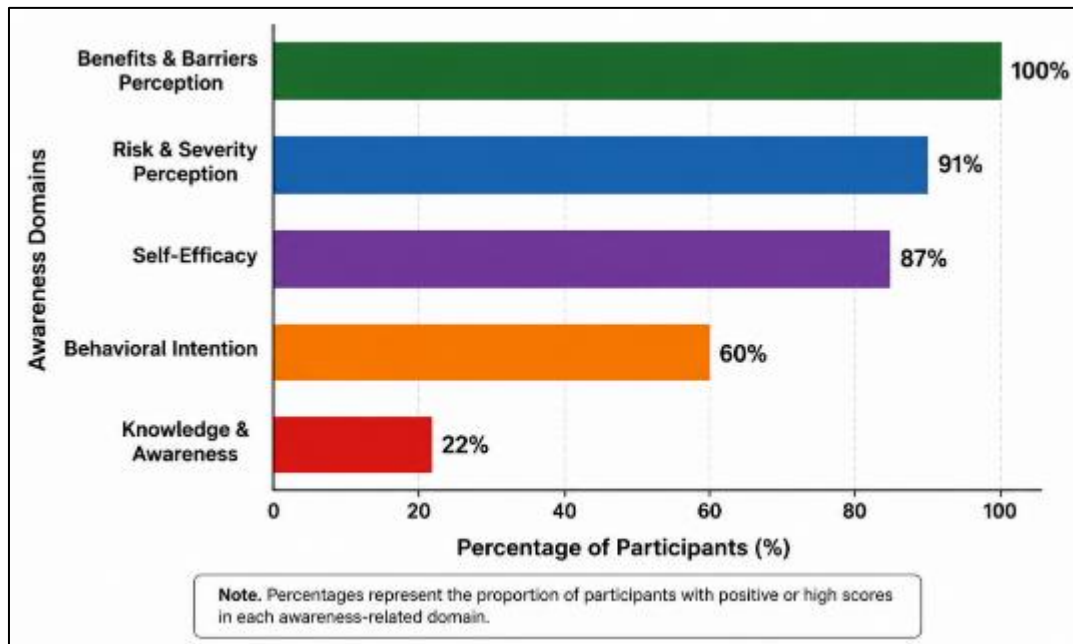


Figure 2 Awareness Domains Profile Regarding Foot Orthosis

Figure 2. Distribution of positive/high scores across awareness-related domains regarding foot orthosis among individuals with diabetic foot complications (N = 100). While participants reported highly favourable perceptions of the benefits of foot orthosis and strong self-efficacy, knowledge and awareness remained considerably lower.

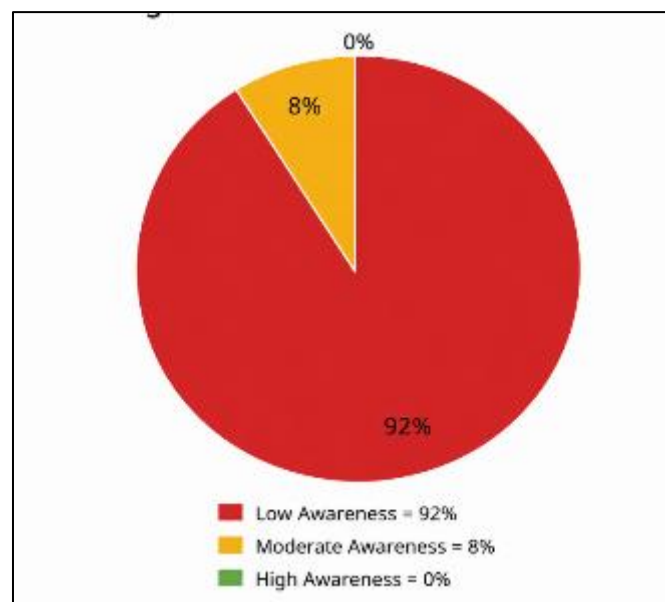


Figure 3 Overall Awareness Level Regarding Foot Orthosis

Figure 3 presents the overall awareness levels regarding foot orthosis among individuals with diabetic foot complications. The vast majority of participants (92.0%) demonstrated low awareness, while only 8.0% exhibited moderate awareness. No participant achieved a high awareness score. These findings indicate a substantial knowledge gap regarding foot orthosis within the study population despite generally positive perceptions of its benefits and favorable self-efficacy levels.

3.1. Association Between Awareness and Foot Orthosis Use

A Chi-square test was conducted to examine the association between awareness of foot orthosis and foot orthosis use. The results revealed a statistically significant association between awareness level and foot orthosis use ($\chi^2 = 53.063$, $df = 2$, $p < .001$), indicating that participants with greater awareness were more likely to use foot orthoses.

Table 1 Chi-Square Test Examining the Association Between Awareness and Foot Orthosis Use

Statistic	Value	df	p-value
Pearson Chi-Square	53.063	2	< .001
Likelihood Ratio	34.631	2	< .001
Linear-by-Linear Association	46.586	1	< .001

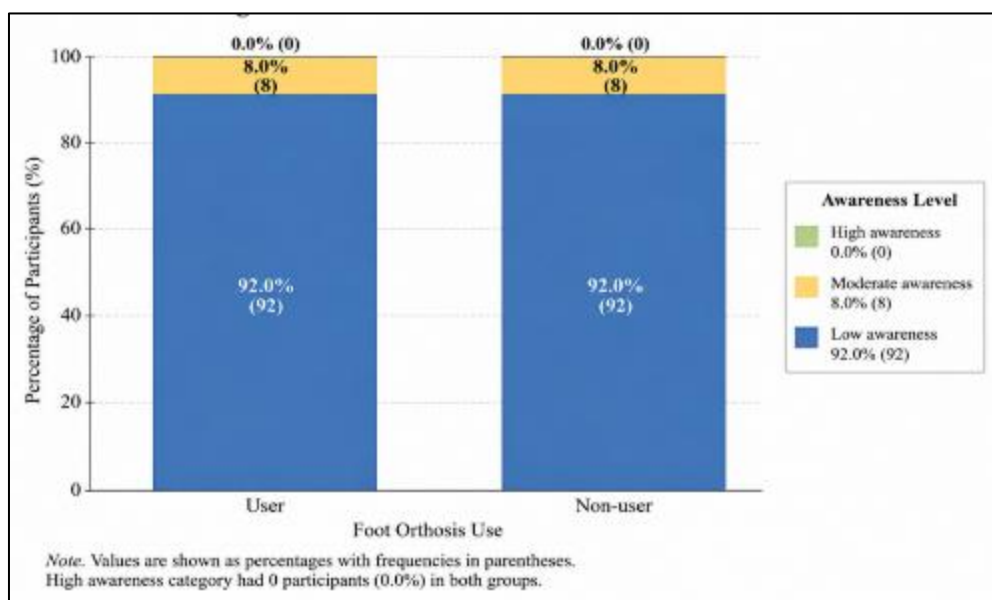


Figure 4 Awareness and Foot Orthosis Use

Figure 4 presents a stacked bar chart illustrating the distribution of awareness levels regarding foot orthosis use among the study participants. The findings demonstrate a predominantly low level of awareness in the study population. Out of the total participants ($n = 100$), the vast majority exhibited low awareness (92%), while a small proportion demonstrated moderate awareness (8%). Notably, none of the participants (0%) were found to have a high level of awareness.

Table 1 Mann-Whitney U Test Comparing Awareness Scores Between Foot Orthosis Users and Non-Users

Test Statistic	Value
Mann-Whitney U	10.000
Wilcoxon W	4288.000
Z	-5.393
p-value	< .001

These findings suggest that greater awareness regarding foot orthosis is associated with increased utilization among individuals with diabetic foot complications. A Mann-Whitney U test was performed to compare awareness scores between participants who used foot orthoses and those who did not. The analysis demonstrated a statistically significant difference in awareness scores between the two groups ($U = 10.000$, $Z = -5.393$, $p < .001$). Participants who used foot orthoses exhibited significantly higher awareness scores than non-users.

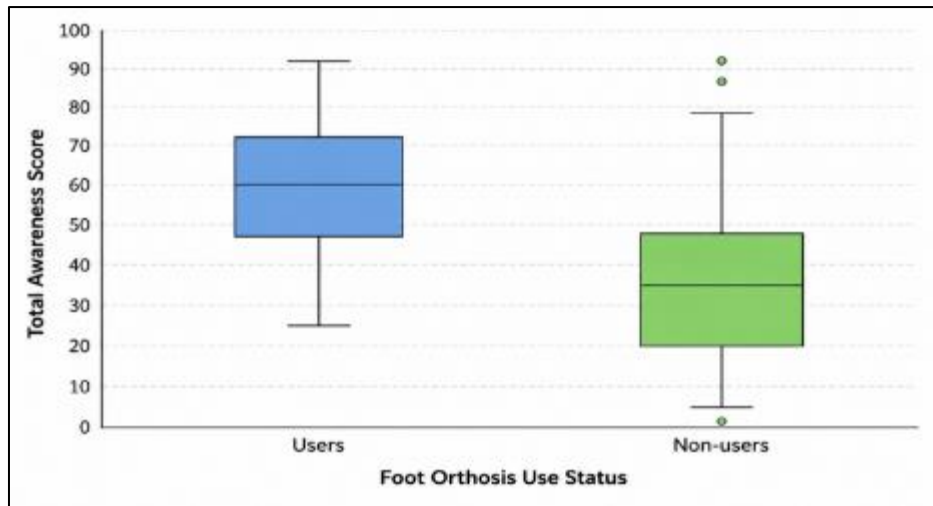


Figure 5 Box plot illustrating the distribution of total awareness scores among foot orthosis users and non-users.

The box plot demonstrates a clear difference in the distribution of awareness scores between foot orthosis users and non-users. Users show a higher median awareness score compared to non-users, indicating greater overall awareness in this group. The interquartile range suggests relatively more concentrated scores among users, whereas non-users exhibit lower central tendency and wider variability in awareness scores.

4. Discussion

The study aimed to assess foot orthosis awareness and its relationship with foot orthosis use among people who have diabetic foot complications in Bangladesh. In addition, awareness was significantly correlated with the use of foot orthoses, indicating that awareness might be an important factor in promoting preventive foot-care practices among persons with diabetic foot complications (9,12).

Demographic aspects of the participants are in line with the average diabetic foot high risk population. The majority of the participants were middle-aged or older, and had been living with diabetes for over 10 years. The results of these studies are similar to the previous evidence that suggests that diabetic neuropathy and diabetes duration are significant factors in the development of foot morbidity, disability and decreased participation in daily activities (8,9). The high prevalence of type 2 diabetes among participants is also typical of the epidemiology among people in Bangladesh and other LMICs, where the prevalence of the condition is still escalating rapidly (4,6).

The same observation has been reported in previous diabetic foot care studies indicating that patients had positive attitudes towards foot care but poor knowledge and good prevention practices (10,12). This finding implies that there is not only a relationship between the perceived level of confidence and awareness but also a relationship with the level of access to the right information, education, and healthcare guidance (12).

The high proportion of participants who had a low overall awareness is of particular concern as foot orthoses have been shown to lower plantar pressure, prevent recurrence of ulcers, improve comfort, enhance mobility and prevent lower-limb amputation (7,9,14). This low awareness in the study could be attributed to low levels of patient education, limited counselling on how to manage diabetic foot, limited access to orthotics and inadequate structured community based awareness programmes (10,12). In resource poor health systems like in Bangladesh, these barriers are likely to be more important (6,10).

Educational status was also previously reported as an important predictor of diabetes self-management, awareness and preventive foot-care practices (6,12). Thus, culturally appropriate and accessible educational approaches need to be planned if reaching individuals with different literacy levels is to be achieved. The use of appropriate orthotics has been shown in previous studies to increase comfort, redistribute plantar pressures, lower the likelihood of ulcers developing and increase functional mobility of people with diabetic foot problems (7,9,14). Alternatively, health information presented to them, professional counseling, and rehabilitation services could be more impactful in their awareness and prevention behaviors (10,12).

The results highlight the importance of a multi-disciplinary approach to the management of diabetic foot from a clinical and rehabilitation point of view. Healthcare professionals such as occupational therapists, physiotherapists, orthotists, podiatrists, physicians, and diabetes educators can help to raise awareness about the use of foot orthosis and encourage adherence to preventive foot-care practices. Structured foot orthosis education can enhance patient engagement, allow for early intervention, and help lower the rates of ulceration, hospitalizations, and lower-limb amputation (8,9,14). As diabetes and the associated burden of DFU are growing in the country, awareness and access to preventive interventions involving the use of orthotics should be considered a public health priority (6,10). Second, the cross-sectional design does not allow for inferences to be drawn about causal relationships between awareness and orthosis use (15). Third, thirdhand smoke was measured using self-report questionnaires that could be susceptible to recall and social desirability bias (15).

Specific education, counseling, increased awareness and access to orthotic services could be an effective strategy for the prevention of diabetic foot complications and its associated burden in the long-term (9,10,12,14).

5. Conclusion

The study found that awareness of foot orthosis among people with diabetic foot complication is very low knowledge (78%) but moderate to high perception and self-efficacy, indicating awareness of foot care importance and confidence in managing orthosis if prescribed. However, actual behavioral practices were limited, with few participants consistently inspecting their feet, using orthosis, or encouraging others to adopt preventive measures. And most of them have no knowledge about it. The study concludes that the overall awareness among the respondents was markedly low, with the vast majority exhibiting inadequate knowledge. Only a small proportion demonstrated moderate awareness, and no participants showed a high level of awareness.

Acknowledgments

Conflict of Interest

Compliance with ethical standards

Acknowledgments

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Disclosure of conflict of interest

The authors declare no conflicts of interest with respect to the research, authorship, or publication of this article.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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