

Chapter 1

Introduction

This chapter describes the background of conducting the study through evidence from relevant, existing literature, showcasing the opportunity to develop the product and required analyses, and hence the study objectives and hypotheses.

1.1 Background

Mountaineering is one of the most popular sports and tourism activities in Indonesia, where there is an abundance of mountains and natural landscapes. This attracts professionals and amateurs who desire to spend their leisure time outdoors (Gaffar et al., 2019). According to Listiana (2025), 350,000 foreign tourists climbed Indonesian mountains in 2023. Additionally, the Central Java government site recorded that almost 960,000 tourists climbed 15 Central Javan mountains in 2025 (Farida & Anggara, 2026). Traction grows as people seek new experiences and purposes, such as social bonding, personal achievement, physical and mental health, competition, education, and distraction from regular activities (Geiger et al., 2023). This mindset of seeking new experiences and openness provides an opportunity to introduce functional foods that can aid their activities.

Mountaineers experience physical and mental stress when traversing through the mountainous environment, which is home to dangers such as unpredictable weather changes, low atmospheric pressure, strong winds, and the risk of falling (Imboden et al., 2024). Therefore, it is a sport that requires good physical health and psychological awareness. Maintaining these requires proper nutrition, as insufficient calories and essential nutrients may lead to reduced neuromuscular function and even impact cognition and physical performance. Consuming sufficient nutrition can be challenging in places with less access to fresh food (Angelini, 2024; Karpęcka-Gałka & Frączek, 2024).

It is common practice for mountaineers to carry processed and freeze-dried foods as they are easily transported, consumed, and often have favored textures and/or flavors, despite the existing concern of excessive food additive intake from ultra-processed foods or UPFs (Karpęcka-Gałka et al., 2025). They are still popular due to being dense in calories but lightweight for backpacks, where an excessive load can disrupt balance and increase the risk of injury (Klughardt & Schaar, 2025; Deonarain & Karki, 2022). This is supported by the preliminary survey (PS) that was done to propose this study: 40.9% of the mountaineers have a backpack load of 10–15 kg, 31.8% with 16–20 kg, 22.7% with <10 kg, and 4.5% with >20 kg. It was also found that most mountaineers choose to bring foods that they perceive as high in carbohydrates and protein, with chocolate snacks (20.5%) and cereal bars (21.6%) being the majority. Common reasons include being easy to eat on the go, tasting good, and, for cereal bars, being able to provide some satiety. Only 38.6% of the respondents expressed agreement that their foods provided sufficient satiety. In reality, Karpęcka-Gałka et al. (2023) found that the diets of their mountaineers were excessive in fat, which is the macronutrient that takes the longest time to digest (Saha & Pathak, 2021). When developing alternative snacks, it is crucial to consider both the expectations and needs of the mountaineers. As such, it was proposed to develop a fruit leather with improved satiety that is high in carbohydrates, lightweight, convenient, and good-tasting.

Having relatively simple processing methods, fruit leathers often retain most of their original nutrients (Süfer & Palazoğlu, 2019). Additionally, chia seeds were incorporated to provide the needed satiety, as their dietary fiber (>30%) has been noted to be higher than that of dried fruits (Kulczyński et al., 2019). Asian pears (*Pyrus pyrifolia*) are rich in nutritional and bioactive components. While they are underexplored by food researchers, there have been attempts to use the fruit in candy, jam, wine, and jelly (Chandel et al., 2023); Bandaru & Bakshi (2020) made a pear fruit leather with acceptable sensorial properties. However, there were no studies where chia seeds were added to fruit leathers. According to He et al. (2022), chia seeds have good water-holding capacity (WHC). This can alter hygroscopicity, as fruit leathers contain highly hygroscopic ingredients such as simple sugars and

pectin. This causes fruit leathers to change in texture over time, which can cause undesirable loss of chewiness and increased stickiness (Bandaru & Bakshi, 2020). As such, this study investigated the effect of different concentrations of chia seeds on the proximate composition and hygroscopicity rate of pear fruit leather.

1.2 Objective

This topic is a collaborative effort in which the other party analyzed the sensorial acceptability and physicochemical stability, while this paper analyzed the effect of different concentrations of chia seeds on the proximate content and hygroscopicity rate of pear fruit leather. The collective data was utilized to develop an innovative fruit leather snack and determine the optimum amount of chia seeds. For this study, the specific objectives are:

- To develop an innovative pear fruit leather snack guided by primary market research
- To analyze the proximate content of pear fruit leather of different chia seed concentrations
- To determine the effect of chia seed addition on the hygroscopicity rate of pear fruit leather

1.3 Hypothesis

The hypothesis of this study is as follows:

- Null hypothesis (H_0): There is no significant difference between the proximate content and hygroscopicity rate of pear fruit leathers incorporating different chia seed concentrations
- Alternative hypothesis (H_1): There is a significant difference between the proximate content and hygroscopicity rate of pear fruit leathers incorporating different chia seed concentrations