

## CHAPTER II

### LITERATURE REVIEW

#### 2.1 Chickpea

Chickpea (*Cicer arietinum*) is a member of the legume family (*Fabaceae*) and is widely cultivated for its edible seeds (Mangena, 2020). It is an annual herbaceous plant with a deep taproot system, allowing it to access water and nutrients from deeper soil layers (Zhou *et al.*, 2020). The leaves of chickpeas are compound, consisting of three leaflets, and are arranged alternately along the stem. The flowers are white, pink, or purple and are borne in clusters (Jukanti *et al.*, 2019). The fruit of chickpeas is a pod containing one to two seeds, commonly *known* as chickpeas or garbanzo beans (Chand *et al.*, 2021). The seeds are usually round, smooth-textured, and come in various colors, including beige, green, black, and red, depending on the variety (Majid *et al.*, 2020)

The protein content of chickpeas, averaging between 19% to 25% by weight, is particularly *noteworthy* (Lago-Oliveira *et al.*, 2023). Chickpeas also provide a substantial amount of complex carbohydrates, mainly in the form of starch. These carbohydrates serve as a sustained source of energy and help regulate blood sugar levels, making them an excellent option for maintaining stable energy levels throughout the day (Aizpurua-Iraola *et al.*, 2023). Studies have also highlighted that chickpeas' high protein content and well-balanced amino acid profile make them suitable for various food formulations and fortification programs (Rehman *et al.*, 2019), Chickpea protein consists of several distinct protein fractions, each with unique functional and nutritional properties. These major protein fractions, namely albumins, globulins, prolamins, and glutelins, collectively contribute to the overall nutritional profile and versatility of chickpea protein in various food applications

(Grossmann, 2023). Due to their small size and solubility in water and weak acid solutions, albumins are easily digestible and can be readily utilized by the human body. Globulins form another major fraction of chickpea protein. These proteins are soluble in dilute salt solutions and are characterized by their globular shape (Pimenta *et al.*, 2023). Globulins play essential roles in enzyme regulation and support the proper functioning of the immune system. Prolamins, on the other hand, are alcohol-soluble proteins found in chickpeas (Ahmed *et al.*, 2022). They are primarily responsible for storing amino acids and nitrogen within the seed. However, prolamins are relatively resistant to proteolytic enzymes, which can affect their digestibility to some extent. Finally, glutelins make up an insoluble fraction of chickpea protein, being neither soluble in water nor alcohol (Bera *et al.*, 2023). These proteins play a crucial role in maintaining the cohesive structure of chickpea seeds, forming the protein matrix within the seed

Essential amino acids are those that the human body cannot synthesize and must be obtained from the diet. However, chickpea protein does have some limitations in certain amino acids. Methionine and cysteine, sulfur-containing amino acids, are present in relatively lower levels in chickpeas compared to animal-based proteins. On the other hand, chickpea protein is relatively higher in lysine compared to some other plant-based proteins like cereals (Grasso *et al.*, 2022). To overcome the amino acid limitations of chickpea protein, it is often recommended to combine it with other plant-based protein sources, such as grains, to create a complementary protein profile. This can be achieved through traditional food pairings like chickpeas and rice, which together provide a more balanced amino acid profile (Patil, 2023).

**Table 2. 1** Nutrition Comparison between 100 gr of potato, tempeh, and droid chickpea.

Nutrition	Potato	Tempeh	Dried chickpea
Moisture (g)	83,4	55,3	11,6
Protein (g)	2,1	20,8	23,8
Fat (g)	0,2	8,8	1,4
Carbohydrates (g)	13,5	13,5	60,2
Fiber (g)	0,5	1,4	17,4
Ash (g)	0,8	1,6	3,0

Source: TKPI,2019; TKPI, 2019; TKPI, 2019.

## 2.2 Perkedel

According to (Irawan *et al*, 2023) In March 1602, expedition that was the beginning of the emergence of a large trading partnership that named VOC (*Vereenigde Oostindische Compagnie*). At first this expedition main target was for trading but due to the external and internal conflict of Dutch East Indies (Hindia-Belanda), Netherlanders used it to colonize Dutch East Indies (Hindia-belanda). The Netherland colonial period did not only bring political, but also Netherland cultural began to spread to the indigenous people on the island of Java. The spread of Netherland cultures then produces a distinctive culture as a result acculturation known as *Indis* culture. *Indische* culture preservation cannot be separated from the role of the supporting community in applying elements of lifestyle which includes architecture, dress, language, and eating habits. One of *Indis* culture which was most popular during the colonial period was the culture of eating known as *Rijsttafel*. (Astuti, 2023). in this rijsttafel banquet is that although most of the food served is indigenous food, there are also some European dishes which were later adapted into Indigenous food (Irawan *et al*, 2023). One of the most popular dish is called *Frikadeller* in the Netherlands is mostly made of minced and fried minced meat (Anggeraeni, 2018). the tongues of the Indigenous people who find it difficult to pronounce *frikadel* turn it into perkedel, in Central Java and East Java they call it bergedel.

The perkedel themselves underwent several adjustments, namely by combining various types of Indigenous food ingredients, so that they became tempeh perkedel, tofu perkedel and corn perkedel (Irawan; Santosa, 2023). In this era perkedel is a food commonly made from fried potatoes or boiled before being crushed and then mixed with minced meat, sliced leaves onions, and celery leaves then mixed with spices. Round shape flattened dipped in beaten chicken eggs (Rafiansyah, 2017).

### 2.3 Frying

Frying method is putting the ingredient into oil at temperatures of at least 160-180 °C, oil is employed as the heating medium during classic frying. After being exposed to hot oil, the original structure of fried foods is dramatically altered. Fried potato chips are usually produced with a crispy skin and great taste by frying in the 170-180 °C range. The process of frying comprises several concurrent actions. The first is cooking, which results in several heat-induced chemical processes, such as the denaturation of proteins, the Maillard and caramelization reactions, as well as the gelatinization of starches. Starch gelatinization refers to the breakdown of the molecular structure of the starch granule, which causes particle expansion and decreased solubility. It is important to keep fried foods from absorbing oil and to create a crust on top of them. The second is dehydration, the water in the frying foods is quickly evacuated as steam since the temperature is continually kept much over 100 °C. The goods structure, texture, and lipid content all change as a result of the frying process. Foods cooked in oil absorb the oils nutrients and are nutrient-modified, which increases the calorie content of the dish (Zhang *et al.*, 2020). but it does not harm the body as fast food which is rich in saturated fat, such as hamburger. Therefore, it is lighter in damage from all those fast food (Ismail *et al.* 2017).