Chapter 16
Lentils (*Lens culinaris*, L.): A Novel Functional Food

Mo'ez Al-Islam Ezzat Faris
University of Sharjah, UAE

Amita Attlee
University of Sharjah, UAE

ABSTRACT

Lentils have been part of human diet from ancient times. This chapter focuses on the nutritional composition, presence of bioactive substances, antioxidants and health rendering properties of lentils. Recent definitions have considered lentils as a prophylactic and therapeutic functional food due to its considerable content of essential macronutrients, namely functional proteins and carbohydrates, and essential micronutrients, as well as bioactive phytochemicals such as phytates and polyphenols. Indeed, the presence of an impressive arsenal of secondary metabolites, minerals and bioactive constituents in lentils have shown to be promising contributors in the management and prevention of several human chronic diseases, attributed to their anticarcinogenic, hypoglycemic, hypocholesterolemic and blood-pressure lowering properties.

INTRODUCTION

Lentils are a part of legume family and form an important constituent of traditional diets. There has been an emerging interest in lentils as functional food due to their high nutritional value, presence of bioactive components, antioxidants and other phytochemicals that render health properties to lentils. Evidence supports that consumption of lentils is related to reduced incidence of chronic diseases such as cardio-vascular disease, overweight and obesity, diabetes and cancers. This chapter aims to highlight the importance of human consumption of lentils and emphasize their contribution as a functional food in the diets. Specifically, the chapter is logically organized to provide an in-depth review and update about nutritional composition, presence of bioactive substances, antioxidants and other phytochemicals in lentils, followed by evidence on their vital role in promoting health of body systems, and reduction in incidence of chronic diseases and in alleviating their symptoms.

DOI: 10.4018/978-1-5225-5207-9.ch016

BACKGROUND

Food and Agricultural Organization (FAO) has defined the terms legumes, pulses and lentils. A legume is a simple dry fruit which develops from a simple carpel and usually dehisces (opens along a seam) on two sides. Pulses are important food crops due to their high protein and essential amino acid content. Like many leguminous crops, pulses play a key role in crop rotation through their ability to fix atmospheric nitrogen. Lentils (*Lens culinaris* L.) are a member of the Leguminoceae family. Lentil plant is an annual plant with flattened edible seeds that constitutes one of the most important traditional dietary components (FAO, 1988). Its lens-shaped seeds exist with a spectrum of colors including yellow, red, orange, green, brown or black depending on the cultivar, and subsequently the composition of the seed coats and cotyledons (Xu & Chang, 2010).

Lentils are relatively tolerant to drought and are grown in all five continents of the world. FAO (2008) reported that world's production of lentils was about 2.83 million metric tons, primarily coming from Canada (36.9%) and India (28.7%), followed by Nepal, China and Turkey.

Lentils have been incorporated into different world cuisines throughout the globe. For example, lentils are commonly mixed with cereals such as rice, as in the South Asian dish "Khitchri", the Egyptian dish "Koshari", and the Syriandish "Mjaddara". It is also consumed as dehulled split lentil soup, the most customarily consumed form of lentils in many Middle Eastern countries (Dagher, 1991).

Legumes (pulses) are gaining enough interest as emerging functional foods. Several authors explicitly revised the chemical and nutritional values of lentils, as well as bioactive phytochemicals in pulses and their health benefits (Campos-Vega et al., 2010; Champ, 2002; Duranti, 2006; Rochfort & Panozzo, 2007; Roy et al., 2010; Scarafoni et al., 2007; Tharanathan & Mahadevamma, 2003). The health-improving and disease-preventing aspects of lentils have been supported by a large body of evidence, and have been critically reviewed elsewhere (Faris et al., 2013).

Interestingly, lentils had been mentioned in ancient treatment remedies and were documented by Dioscorides as one of the therapeutic plants (Lardos, 2006). Lentil seeds are used in the folk medicine of many ethnicities to treat different illnesses. They are used orally to treat diabetes (Giday et al., 2007), topically as a water paste to treat skin infections (Teklehaymanot et al., 2007) and for the treatment of burns, after being roasted, milled and applied directly to affected areas (Sezik et al., 2001). In addition, lentils are used as a source of lectins for the treatment and prophylaxis of retroviral infections including human immunodeficiency virus (HIV) infections (Alexandre et al., 2010). Ethnopharmacologically, lentil soup was a staple meal in the ancient world, and it was especially prepared for the ailing individual(s) and not for all members of the household unit (Totelin, 2015).

MAIN FOCUS OF THE CHAPTER

Macro and Micro Nutrients

The chemical composition and individual constituents of whole and split lentils are summarized in Table 1 (USDA, 2010).

- **Carbohydrates:** Total carbohydrates represent the major component of lentil seeds (Padovani et al., 2007) with starches occupying most of the carbohydrate mass (Table 1). Among twenty-three