Histological study on the vesicular glands of castrated and non-castrated bucks

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ABSTRACT

The present study was investigated the histological structure of the vesicular glands of eight mature castrated and non-castrated zaraibi bucks (4 animals/ each group). Generally, the vesicular gland of bucks was compact and lobulated gland. It was covered by a muscular capsule sending fibro-muscular septa dividing the gland into irregular unequal lobules. Each lobule was formed of numerous secretory acini and few amount of inter-acinar connective tissue stroma. Each lobule had a central collecting sinus to collect the secretions from the different acini. Both secretory acini and central collecting sinuses were lined mainly with pseudostratified columnar epithelium that was consisted mainly of secretory columnar cells and few small basal cells. The secretion was released into the acinar limen via apocrine mode. The castrated bucks showed more connective tissue and less acinar components in comparison to non-castrated bucks. Such finding represents the histological difference between the vesicular gland of castrated and non-castrated bucks that pointed out the effect of castration on structure of the vesicular gland.

Keywords: Vesicular gland; Histology; Castration; Bucks.

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1. INTRODUCTION

Vesicular gland's secretion constitutes the major composite of the seminal plasma. Seminal fluid secreted from vesicular glands contains fructose, citric acid, vitamin C, riboflavin, and prostaglandin (Hafez, 1987; Rahman et al., 2010) that supports and maintains sperm metabolism, vitality, and motility in males (Peitz, 1988; Fernandez-Juan et al., 2006, Devi et al., 2013). Moreover, the removal of seminal vesicles from the animal induces infertility (Queen et al., 1981; Peitz and Olds-Clarke, 1986). All of these information indicates the importance of vesicular gland in male fertility. Many investigations on vesicular glands of the goats are recorded from anatomical, developmental and histological view (Gupta, 1978; Kundu, 1980; Gupta, 1989; Gupta et al., 1993; Farooqui, 2004; Archana, 2006; Khalaf and Merhish, 2010; Verma et al., 2013; Farooqui et al., 2014) although, little work to detect the effect of castration on the histological structure of the vesicular glands of bucks are available. Hence, the present study has been carried out to represent the histological difference between the vesicular gland of castrated and non-castrated zaraibi bucks.

2. MATERIALS AND METHODS

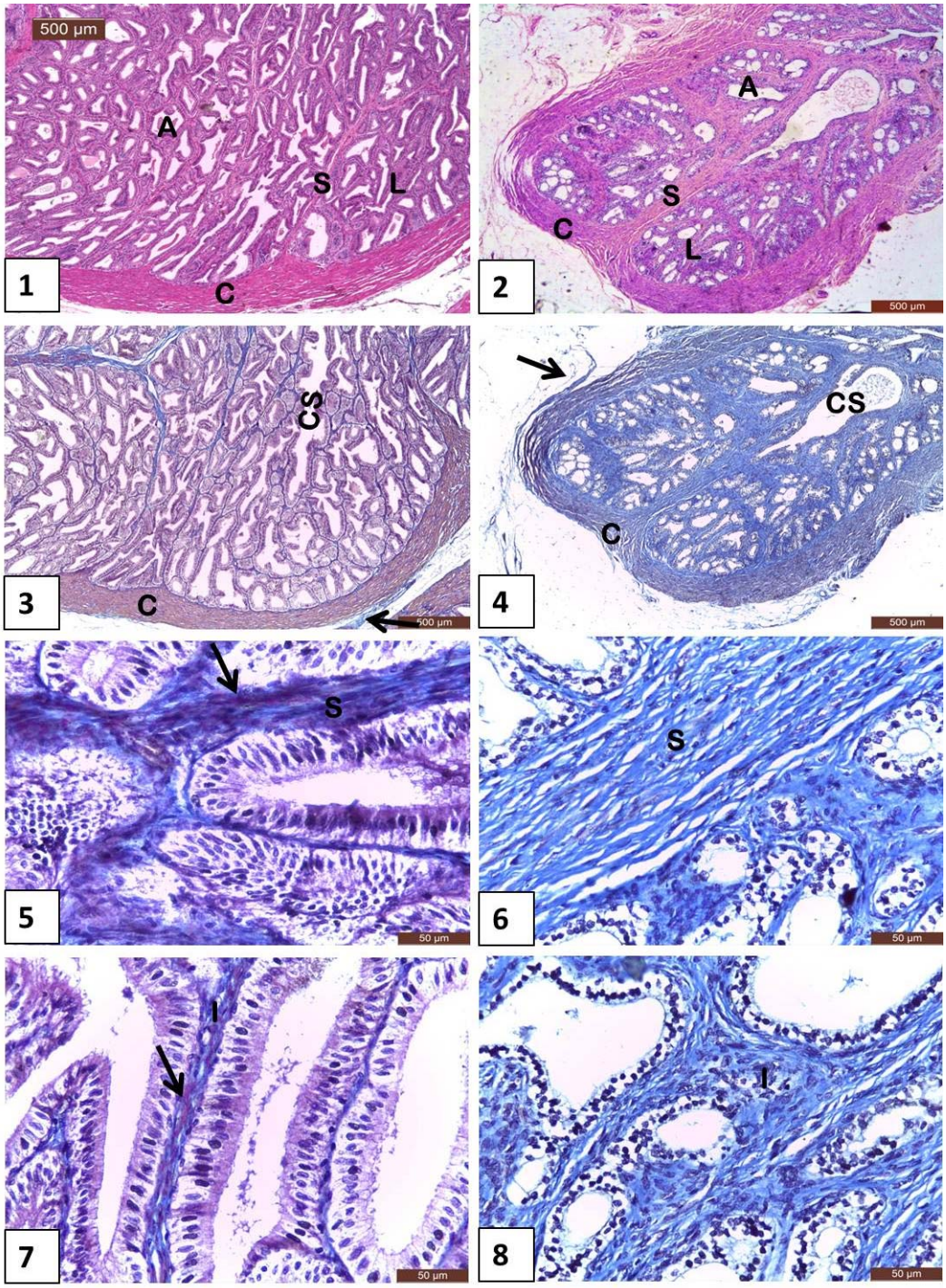
Vesicular glands of eight apparently healthy mature castrated and non-castrated zaraibi bucks (4 animals/ group) were collected from Toukh abattoir in Kalubyia province for histological evaluations. Small specimens from both right and left vesicular glands of each buck were collected and immediately fixed in 10% buffered neutral formalin. The fixed specimens were dehydrated in ascending grades of ethanol, cleared in xylene and embedded in paraffin. 5 µm thick sections were obtained and stained with:

a. Harris's hematoxylin and Eosin (H & E) as routine histological work for general structure.
b. Masson's trichrome stain for demonstration of collagen fibers and muscle cells
c. Periodic acid Schiff technique (PAS) for detection of neutral and some acidic mucopolysaccharides.

The staining methods were carried out as outlined by Bancroft and Gamble (2001). The microphotography was taken using a Leica microscope.

3. RESULTS

Generally, histological examination of the vesicular glands of bucks revealed that it was consisted of stroma and parenchyma. Stroma of the



Figs. 1 & 2: Photomicrographs of the vesicular gland of non-castrated and castrated bucks respectively showing, capsule (C), septa (S), lobules (L) and acini (A). H&E. Scale bar = 500 µm. Figs. 3 & 4: Photomicrographs of the vesicular gland of non-castrated and castrated bucks respectively showing muscular capsule (C), pericapsular loose connective tissue (arrow) and collecting sinus (CS). Masson's trichrome stain. Scale bar = 500 µm. Fig. 5: Photomicrograph of the vesicular gland of non-castrated buck showing abundant smooth muscle cells (arrow) in the interlobular septa (S). Masson's trichrome stain. Scale bar = 50 µm. Fig. 6: Photomicrograph of the vesicular gland of castrated buck showing thick interlobular septa (S) containing few smooth muscle cells. Masson's trichrome stain. Scale bar = 50 µm. Fig. 7: Photomicrograph of the vesicular gland of non-castrated buck showing thin inter-acinar connective tissue (I) containing smooth muscle cells (arrow). Masson's trichrome stain. Scale bar = 50 µm. Fig. 8: Photomicrograph of the vesicular gland of castrated buck showing thick inter-acinar connective tissue (I) containing mainly collagen fibers with no smooth muscle cells. Masson's trichrome stain. Scale bar = 50 µm.

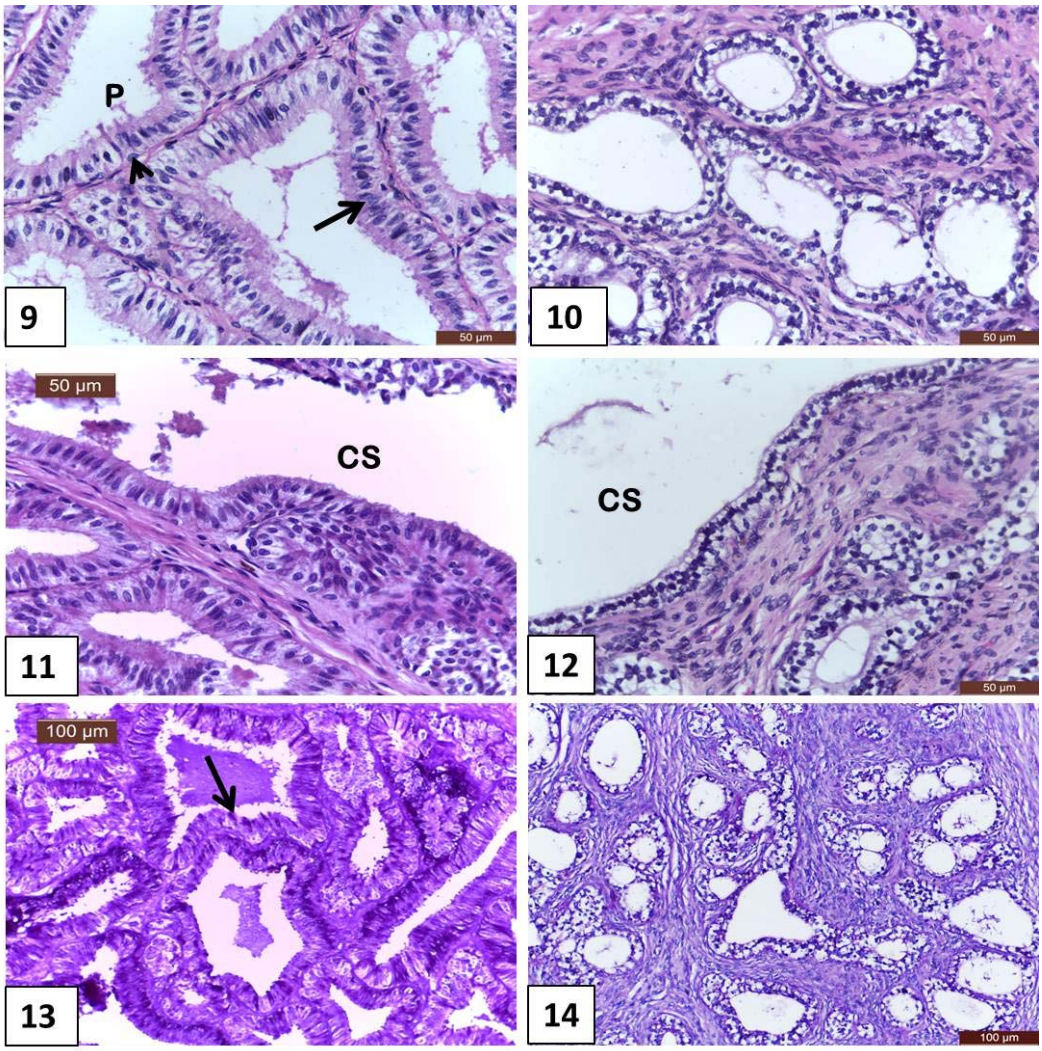


Fig. 9: Photomicrograph of the vesicular gland of non-castrated bucks showing the lining epithelium of the acini. Secretory columnar cells (arrow), few small basal cells (arrowhead) and acidophilic bleb-like apical projections (P). H&E. Scale bar = 50 µm. Fig. 10: Photomicrograph of the vesicular gland of castrated bucks showing the lining epithelium of the acini. Note lower lining epithelium than in non-castrated bucks. They were mainly cuboidal to low columnar epithelial cells. H&E. Scale bar = 50 µm. Figs. 11 & 12: Photomicrographs of the vesicular gland of non-castrated and castrated bucks respectively showing central collecting sinus (CS) that lined with pseudostratified columnar epithelium. H&E. Scale bar = 50 µm. Figs. 13 & 14: Photomicrographs of the vesicular gland of non-castrated and castrated bucks respectively showing positive reactivity for PAS in some secretory cells of the acini (arrow). PAS technique. Scale bar = 100 µm.

vesicular glands was formed of capsule, septa and inter-acinar connective tissue (Figs.1&2). The capsule of vesicular glands was consisted mainly of smooth muscle layers that were covered externally with loose connective tissue in both mature non-castrated (Fig.3) and castrated bucks (Fig.4). From capsule, many septa were arisen and run into parenchyma to divide the gland into many lobules. The interlobular septa were vascularized dense collagenous connective tissue containing abundant smooth muscle cells (Fig.5) in non-castrated bucks but, it was thicker septa with fewer smooth muscle cells in castrated bucks (Fig.6). From septa, inter-acinar connective tissue was arisen to surround each acinus. In non-castrated bucks, the inter-acinar connective tissue was thin with more smooth muscle cells (Fig.7) while it was thicker with little smooth muscle cells in castrated bucks (Fig.8).

The parenchyma of each lobule was formed of secretory acini and a central collecting sinus. The acini were numerous in non-castrated bucks (Figs.1&3) but it was fewer in amount in castrated bucks (Figs.2&4). The acini were lined with pseudostratified columnar epithelium consisting mainly of secretory columnar cells with solitary small basal cells. In non-castrated bucks, the secretory columnar cells had vacuolated

cytoplasm, ovoid or oval nuclei, and most of them had acidophilic bleb-like apical projections (Fig.9). However, in castrated bucks, the height of the lining epithelium was lower than in non-castrated bucks where they were mainly cuboidal to low columnar cells (Fig.10). The central collecting sinus of each lobule was lined with pseudostratified columnar epithelium in both castrated and non-castrated bucks (Figs.11&12). All of basement membrane of acini, secretory columnar cells, bleb like projections and secretions showed positive reactivity for PAS in both castrated and non-castrated bucks (Figs.13&14).

4. DISCUSSION

The present histological investigation revealed that the vesicular glands of mature zaraibi buck were consisted mainly of stroma and compound tubule-alveolar parenchyma that was in accordance with goats of other breeds (Kundu, 1980; Farooqui, 2004; Archana et al., 2009), ram (Abbas, 1976; Naidu and Pattabhiraman, 2001; Bacha and Bacha 2012) and buffalo bull (Fahmy and Osman, 1972; Ghonimi et al., 2014). However, such finding contradicts Chandrapal (1976) and Sudhakar et al. (1986) in buffalo bull; Banks (1992) and Eurell and Frappier (2006) in bovines as they described the wall of vesicular gland into 4 layers; tunica mucosa, tunica propia-submucosa, tunica musculosa and tunica adventitia.

The fibromuscular stroma of the vesicular gland of bucks was in agreement with Archana et al. (2009) in goat; Abbas (1976) in ram; Fahmy and Osman (1972) and Ghonimi et al. (2014) in buffalo bull. The abundance of smooth muscles produces strong contraction aiding in evacuation of the gland secretion during ejaculation (Eurell and Frappier, 2006; Samuelson, 2007). The vesicular gland of bucks was covered with a vascularized peri capsular loose connective tissue adventitia. This finding was in with accordance with Gupta (1978); Gupta et al. (1993); Archana et al. (2009) in goat; Abbas (1976) in ram and Sudhakar et al. (1986) and Ghonimi et al. (2014) in buffalo bull.

From capsule, many fibro-muscular septa were arisen and run into parenchyma to divide the gland into many lobules that was in agreement with Abbas (1976) in ram and Ghonimi et al. (2014) in buffalo bull. The inter-acinar connective tissue was formed of collagen fibers and smooth muscle cells that surrounded the acini that was completely similar to findings of Archana et al. (2009) in goat; Abbas (1976) in ram and Ghonimi et al. (2014) in buffalo bull and nearly similar to Eurell and Frappier (2006) and Samuelson (2007) in bovines. Each lobule in the vesicular gland contained numerous secretory acini and a central collecting sinus. Such result was in a similarity with Gupta (1989) and Archana et al. (2009) in goat; Abbas (1976) and Ploen (1980) in ram and Ghonimi et al. (2014) in bull.

The acini were lined with mainly with secretory columnar cells with few individual small basal cells. Such finding was in accordance with Wrobel (1970) in goat; Abbas (1976) in ram; Fahmy and Osman (1972); Amselgruber and Feder (1986) and Ghonimi et al. (2014) in bull as all of those authors identified two types of cells; columnar cells and low basal cells in the acini of vesicular gland. Meanwhile, three types of cells; A, B and C had been identified by Gupta (1989) in goat, Ploen (1980) and Singh et al. (1980) in ram and Chandrapal (1976) and Sudhakar et al. (1986) in buffalo bull. Moreover, 4 types of cells were identified; columnar, basal, dense and clear cells in boar (Badia et al., 2006). Some of columnar cells possess light, bleb-like apical projections that were supported by report of Eurell and Frappier (2006) that indicate apocrine mode of secretion (Archana et al., 2009). The cytoplasm of the secretory epithelium was vacuolated that was supported by Fahmy and Osman, (1972) who concluded that the cytoplasmic vacuoles occur mainly in mature animal. Moreover, Archana et al. (2009) noticed that the activity of the secretory cells depends up on testosterone level in blood.

The small basal cells rested on the acinar basement membrane and did not reach to luminal surface of the secretory units and embedded in between tall columnar cells (Dellmann and Eurell, 1998).

Our findings showed that the central collecting sinus of each lobule was lined with epithelium similar to that in the acini while it was lined with pseudostratified columnar epithelium in goat (Gupta, 1989; Archana et al., 2009), sheep (Ploen, 1980; Singh et al., 1980) and buffalo (Chandrapal, 1976; Sudhakar et al., 1986).

There was a clear histological difference between the vesicular glands of castrated and non-castrated bucks. Similar contentions have been reported by Neves et al. (2013). Such findings prove that vesicular glands, like other reproductive organs in male, are androgen dependent (Abd Ali and Jassim, 2011).

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