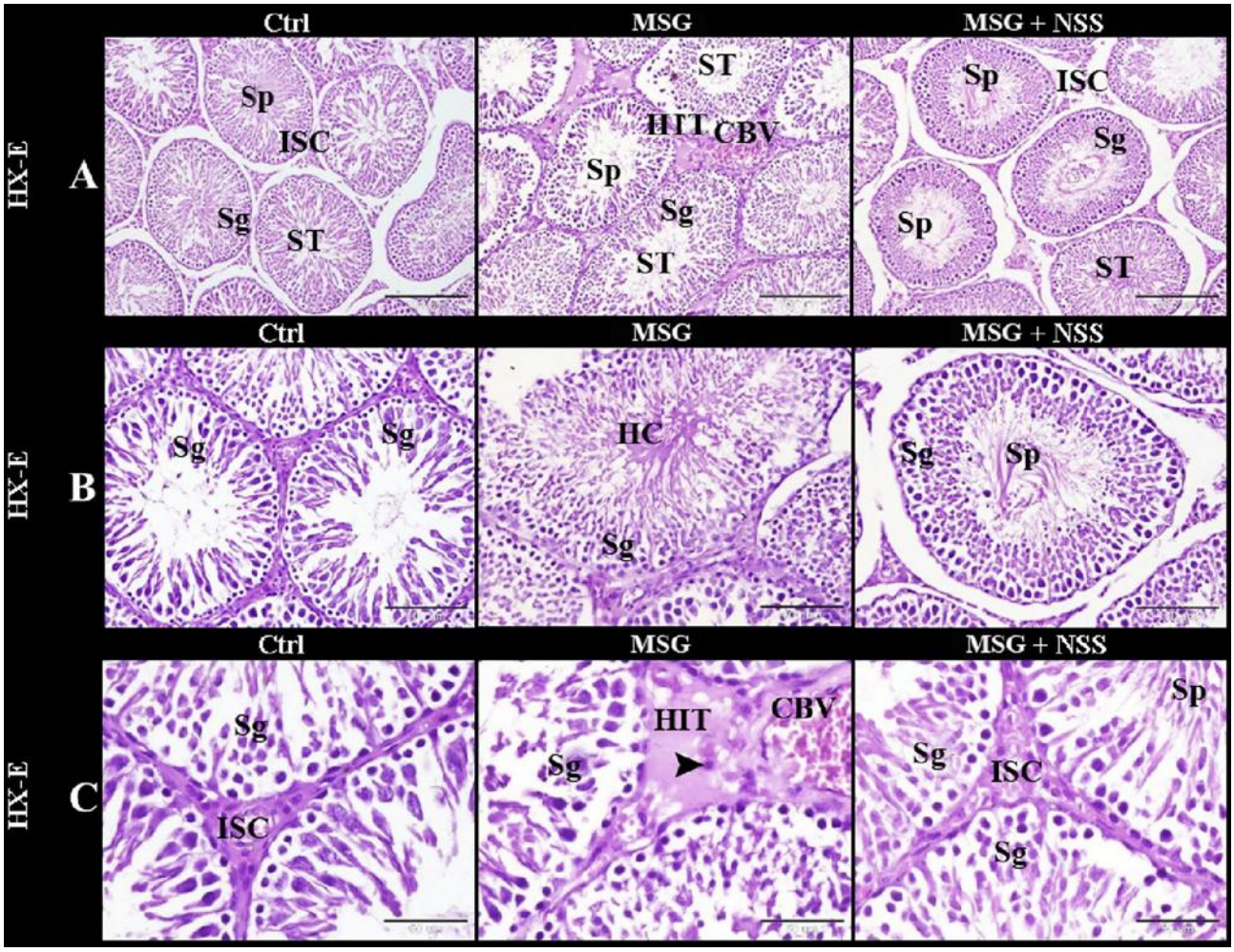

Figure 1. Photomicrograph of paraffin sections in the rats' testes showed the protective effect of NSS on MSG induced testicular damages. Control group (Ctrl) in (**A**–**C**) showed the normal architecture of the testis which formed of regular seminiferous tubules (ST) separated by numerous interstitial cells of Leydig (ISC). The seminiferous tubules were lined by stratified germinal epithelium which represents the spermatogenic cells (Sg) in different stages of development up to mature sperm. The seminiferous tubules had narrow lumen filled with mature sperms (Sp). MSG group in (**A**–**C**) showed irregular seminiferous tubules (ST) separated by hyalinized interstitial tissue (HIT) with apoptotic interstitial cells (arrowhead) and congested blood vessels (CBV). The seminiferous tubules were lined by few layers of the spermatogenic cells (Sg). The seminiferous tubules had a wide lumen with hyalinized center (HC) or contained few numbers of sperms (Sp). MSG + NSS group in (**A**–**C**) showed that the architecture of the testis was retained to normal. It was formed of regular seminiferous tubules (ST) separated by numerous interstitial cells of Leydig (ISC). The seminiferous tubules were lined by stratified germinal epithelium which represents the spermatogenic cells (Sg) in different stages of development up to mature sperm. The seminiferous tubules had narrow lumen filled with mature sperms (Sp). Original magnification; (**A**) ×100, scale bar 200 μm; (**B**) ×200, scale bar 100 μm; (**C**) ×400, scale bar 50 μm, Hematoxylinand Eosin stain.

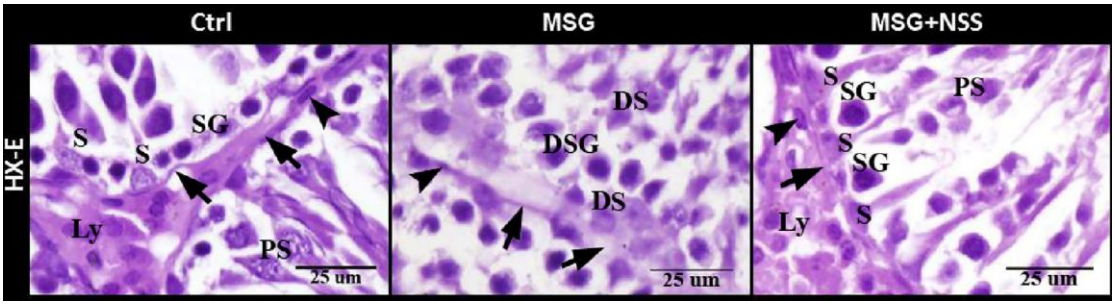

Figure 2. Photomicrograph of paraffin sections in the rats' testes showed the protective effect of NSS on MSG induced testicular damages. Control group (Ctrl) showed the normal healthy Sertoli cells (S) adhered to the continuous basement membrane (arrow), spermatogonia (SG) in the basal compartment next to the basement membrane, the large primary spermatocytes (PS) with filamentous chromosomes next to spermatogonia, flattened smooth muscle like myoid cells (arrow head) outside the basement membrane and Leydig cells (Ly) which were large polygonal cells with rounded centrally located nuclei and vacuolated acidophilic cytoplasm. MSG group showed degenerated Sertoli cells (DS) away from the disrupted basement membrane (arrows), degenerated spermatogonia (DSG) away from the basal compartment, degenerated primary spermatocytes (DS), degenerated myoid cells (arrowhead). MSG + NSS group showed the normal healthy Sertoli cells (S) adhered to the continuous basement membrane (arrow), spermatogonia (SG) in the basal compartment next to the basement membrane, the large primary spermatocytes (PS) next to spermatogonia, flattened smooth muscle like myoid cells (arrow head) outside the basement membrane and Leydig cells (Ly) which were large polygonal cells with rounded centrally located nuclei and vacuolated acidophilic cytoplasm. Original magnification; ×400, scale bar 25 μm, Hematoxylin and Eosin stain.

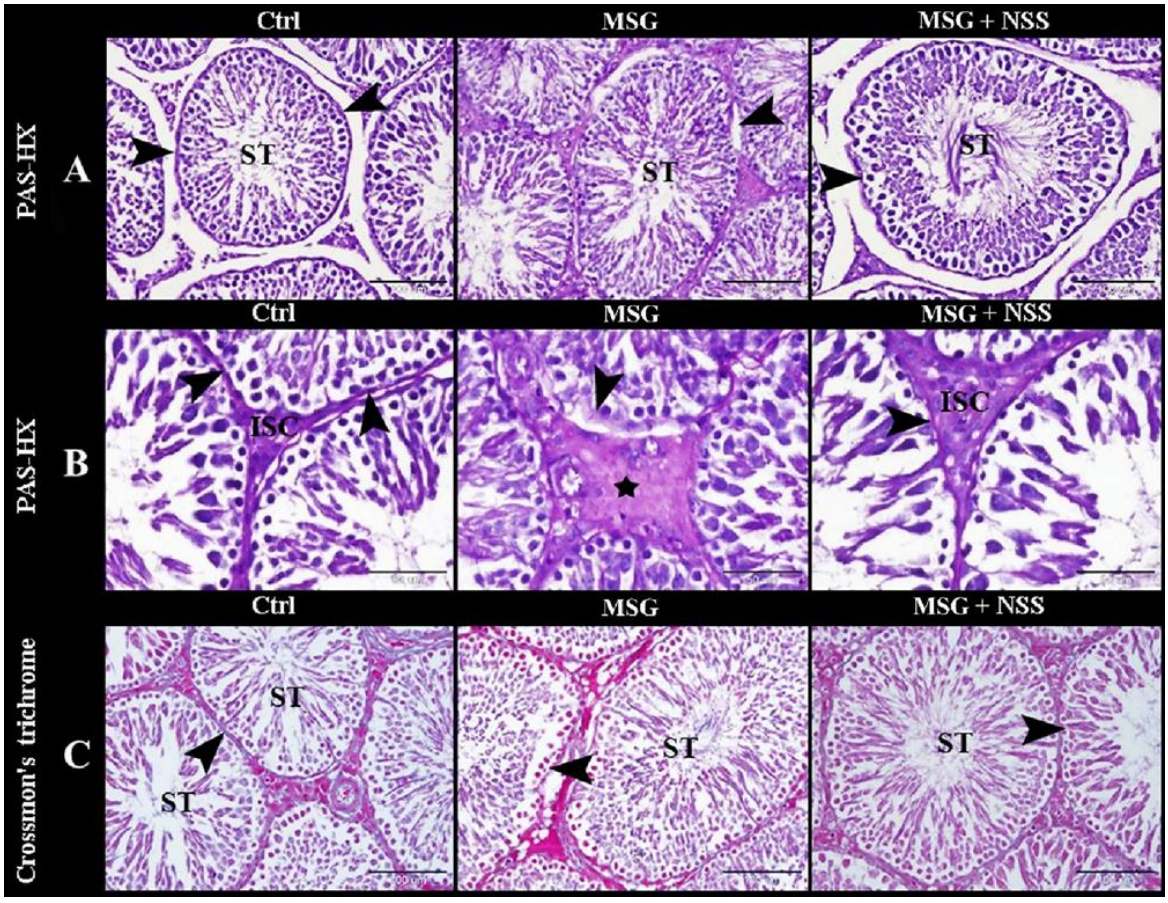

Figure 3. Photomicrograph of paraffin sections in the rats' testes showed the protective effect of NSS on MSG induced testicular damages. Control group (Ctrl) in (A,B) showed the seminiferous tubules (ST) with regular continued PAS positive basement membrane (arrowheads) separated by numerous interstitial cells of Leydig (ISC). MSG group in (A,B) showed the seminiferous tubules (ST) with irregular interrupted PAS positive basement membrane (arrowhead) separated by hyalinized interstitial tissue (star) and congested blood vessels (CBV). MSG + NSS group in (A,B) showed the seminiferous tubules (ST) with regular continued PAS positive basement membrane (arrowhead) separated by numerous interstitial cells of Leydig (ISC). Control group (Ctrl) in (C) showed the seminiferous tubules (ST) with normal peritubular collagen fibers (arrowhead). MSG group in (C) showed the seminiferous tubules (ST) with few, irregular and interrupted peritubular collagen fibers (arrowhead). MSG + NSS group in (C) showed the seminiferous tubules (ST) with regular continued peritubular collagen fibers (arrowhead). Original magnification; (A) ×200, scale bar 100 µm, periodic acid-Schiff (PAS) and hematoxylin, (B) ×400, scale bar 50 µm, periodic acid-Schiff (PAS) and hematoxylin; (C) ×200, scale bar 100 µm, Crossmon's trichrome technique.

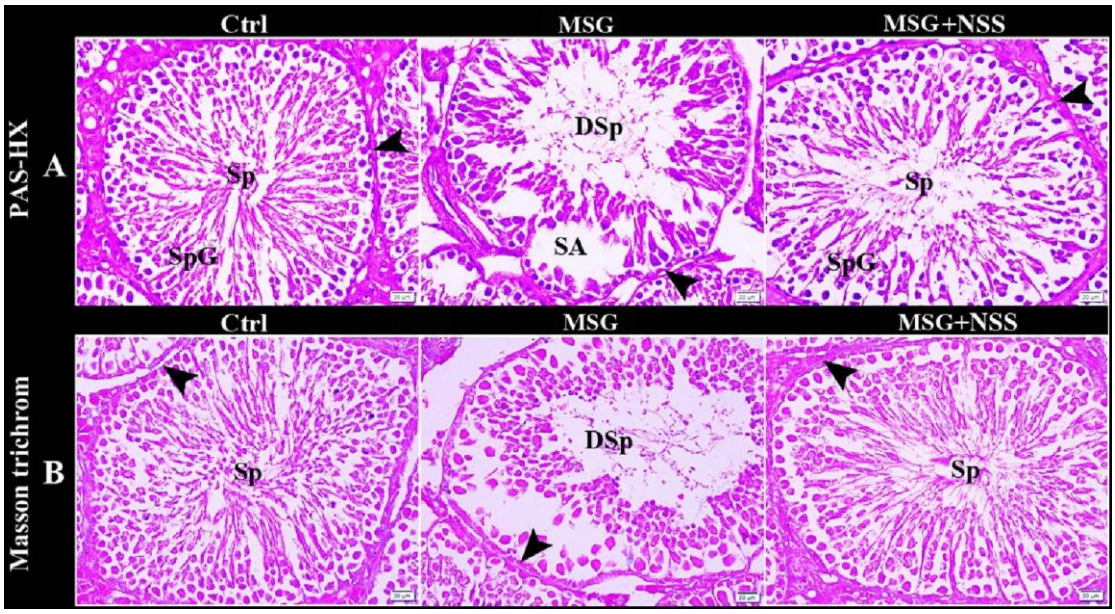

Figure 4. Photomicrograph of paraffin sections in the rats' testes showed the protective effect of NSS on MSG induced testicular damages. Control group (Ctrl) in (**A**) showed the seminiferous tubules with regular continued PAS positive basement membrane (arrowheads). Note the normal healthy developing spermatogenic cells (SpG) and the healthy sperms (Sp) in the lumen of the seminiferous tubules. MSG group in (**A**) showed the seminiferous tubules with irregular interrupted PAS positive basement membrane (arrowhead). Note the spermatogenic arrest (SA) and the degenerated sperms (DSp) in the lumen of the seminiferous tubules. MSG + NSS group in (**A**) showed the seminiferous tubules (ST) with regular continued PAS positive basement membrane (arrowhead). Note the normal healthy developing spermatogenic cells (SpG) and the healthy sperms (Sp) in the lumen of the seminiferous tubules. Control group (Ctrl) in (**B**) showed the seminiferous tubules with normal peritubular collagen fibers (arrowhead) and the healthy sperms (Sp) in the lumen of the seminiferous tubules. MSG group in (**B**) showed the seminiferous tubules with few, irregular and interrupted peritubular collagen fibers (arrowhead) and the degenerated sperms (DSp) in the lumen of the seminiferous tubules. MSG + NSS group in (**B**) showed the seminiferous tubules with regular continued peritubular collagen fibers (arrowhead) and the healthy sperms (Sp) in the lumen of the seminiferous tubules. Original magnification; ×200, scale bar 20 µm, periodic acid-Schiff (PAS) and hematoxylin, (**B**) ×200, scale bar 20 µm, Masson'strichrome technique.

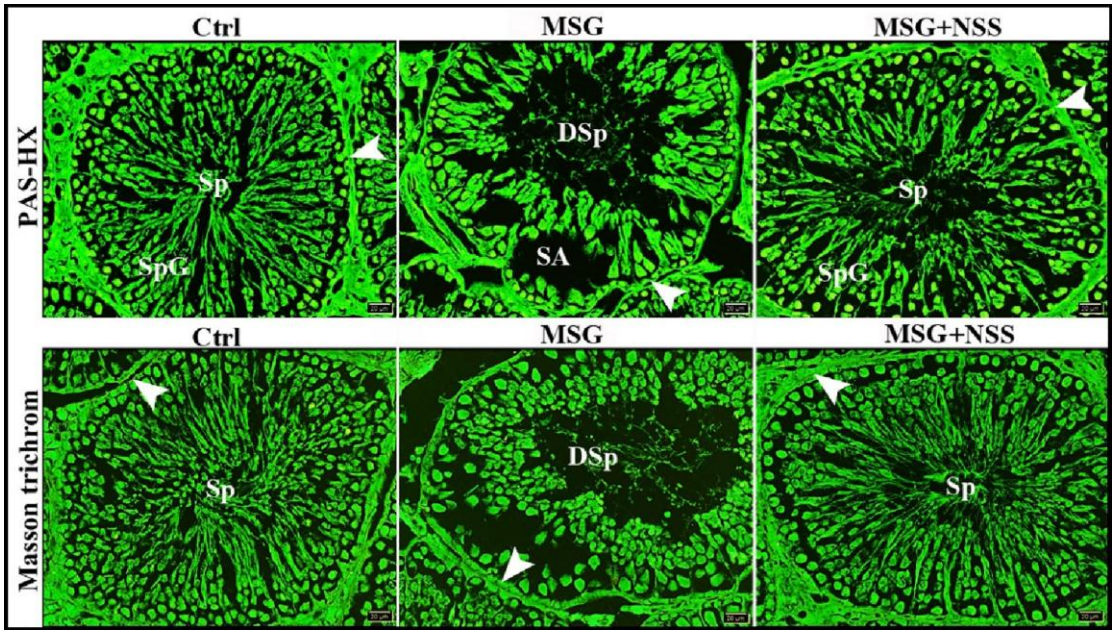

Figure 5. Negative images of the photomicrographs shown in Fig. 4 were analyzed using CMEIAS Color Segmentation 1.0 Software to assess the complex color micrographs and to give more details. https://mybiosoftware.com/cmeias-color-segmentation-1-0-segment-analyze-foreground-objects-complex-images.html.

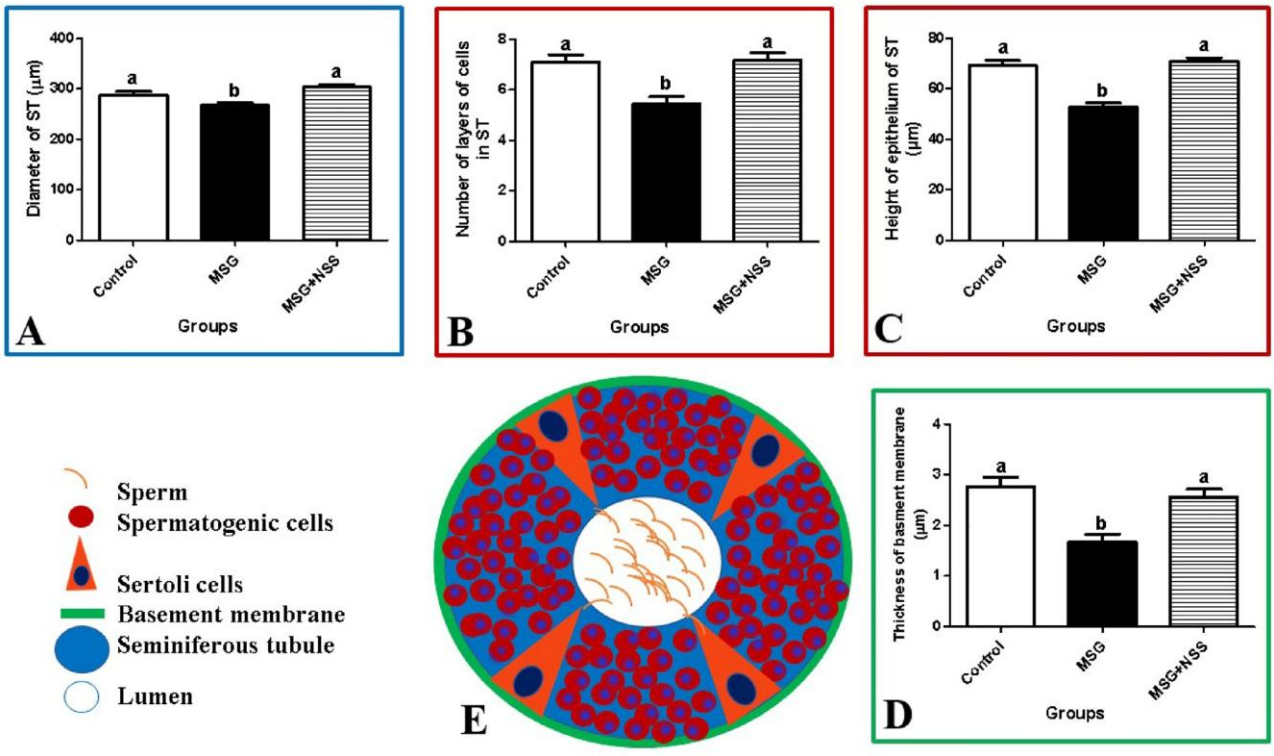

Figure 6. Showed the morphometrical results obtained in the current study analyzed using GraphPad Prism Software version 5 (GraphPad Software Inc., La Jolla, CA, USA) https://www.graphpad.com/scientific-software/ prism/. (**A**) Showed that MSG significantly decreased the diameter of the seminiferous tubules and the addition of NSS kept the normal diameter of the seminiferous tubules. (**B**) Showed that MSG significantly decreased the number of spermatogenic cell layers which lined the seminiferous tubules and the addition of NSS kept the normal number of

spermatogenic cell layers. (**C**) Showed that MSG significantly decreased the height of the epithelium of the seminiferous tubules and the addition of NSS kept the normal height of the epithelium of the seminiferous tubules. (**D**) Showed that MSG significantly decreased the thickness of the basement membrane of the seminiferous tubules and the addition of NSS kept the normal thickness of the basement membrane of seminiferous tubules. (**E**) Showed a diagram drawn by the author using Microsoft PowerPoint 2010 program to illustrate the general histological structure of the seminiferous tubules. https://www.microsoft.com/en-eg/downl oad/details.aspx?id=20873.

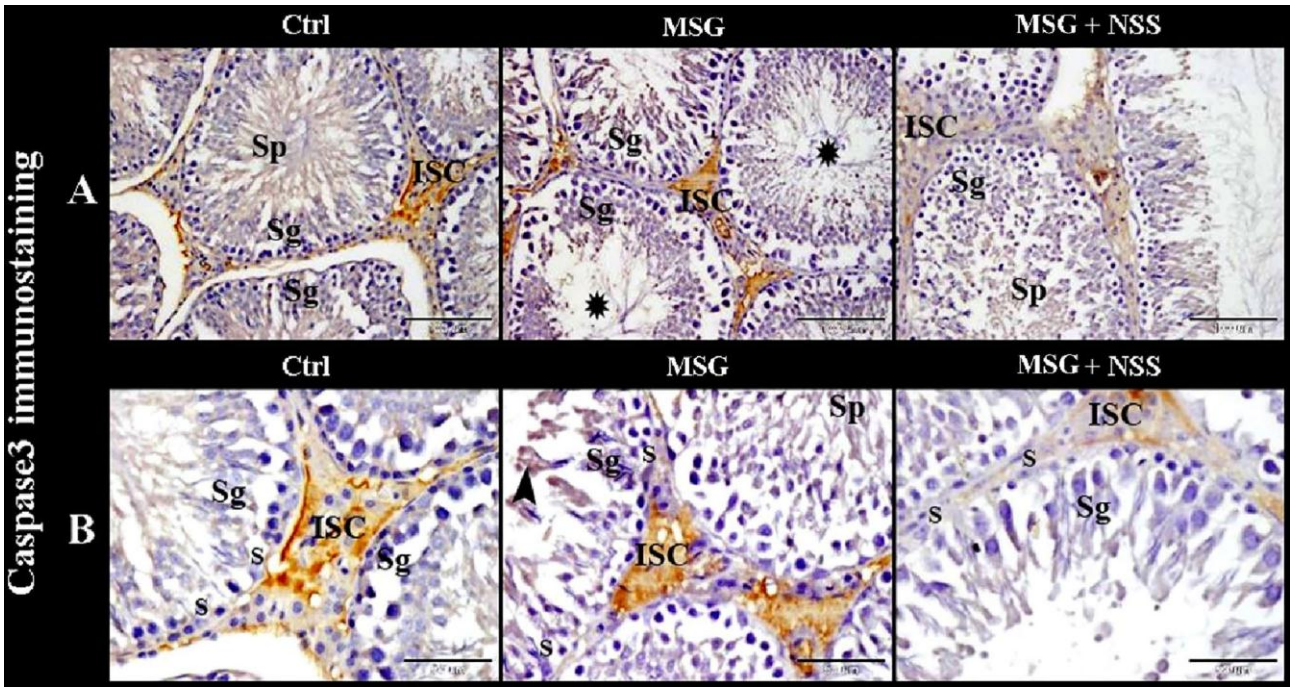

Figure 7. Photomicrograph of caspase-3 immunostaining in the rats' testes showed the protective effect of NSS on MSG induced testicular damages. Control group (Ctrl) in (**A**,**B**) showed negative to weak caspase-3 immunostaining in the spermatogenic cells (Sg), sperms (Sp), Sertoli cells (S) and interstitial cells of Leydig (ISC). MSG group in (**A**,**B**) showed significantly increased caspase-3 immunoexpression in the spermatogenic cells (Sg), spermatids (arrowhead), sperms (Sp), Sertoli cells (S) and interstitial cells of Leydig (ISC). Note the wide empty lumen (balck star) of some seminiferous tubules. MSG + NSS group in (**A**,**B**) showed negative to weak caspase-3 immunostaining in the spermatogenic cells (Sg), sperms (Sp), Sertoli cells (S) and interstitial cells of Leydig (ISC). Positive caspase-3 immunoreactivity presented as a brownish yellow color. Original magnification; (**A**) ×200, scale bar 100 µm; (**B**) ×400, scale bar 50 µm.

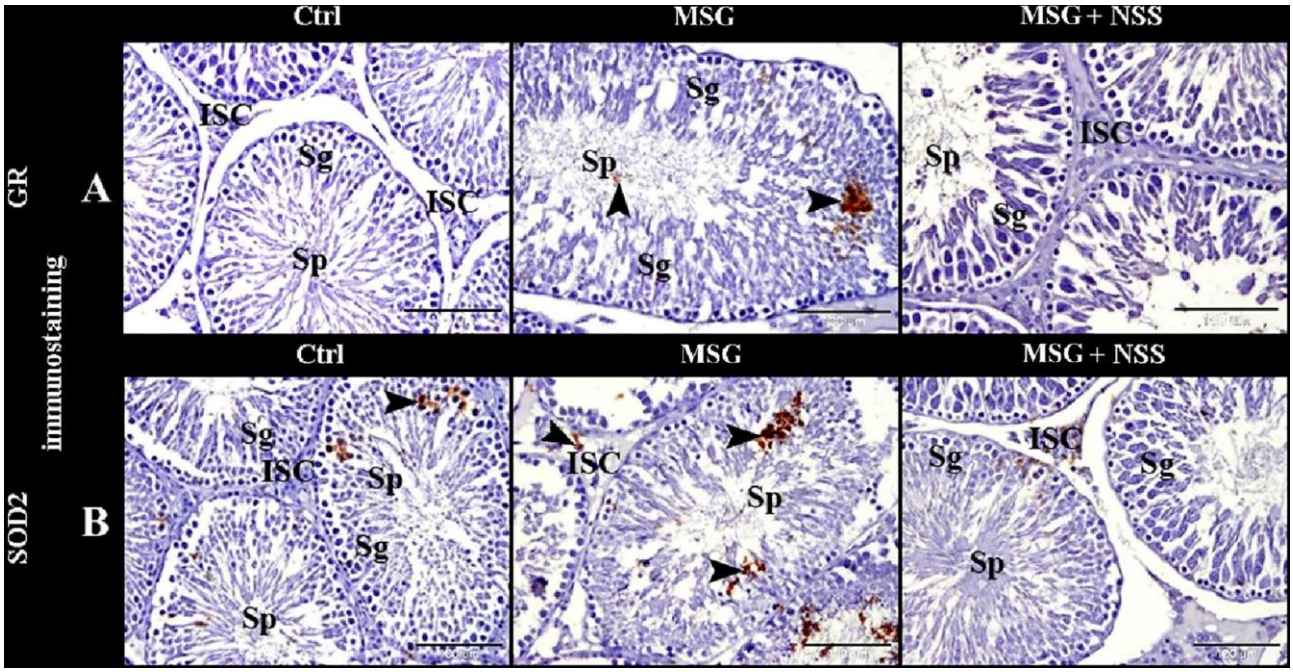

Figure 8. Photomicrograph of GR (**A**) and SOD2 (**B**) immunostaining in the rats' testes showed the protective effect of NSS on MSG induced testicular damages. (**A**) Control group (Ctrl) showed negative GR immunostaining in the spermatogenic cells (Sg), sperms (Sp) and interstitial cells of Leydig (ISC). MSG group showed positive GR immunoexpression (arrowheads) in the spermatogenic cells (Sg) and the sperms (Sp). MSG + NSS group showed negative GR immunostaining in the spermatogenic cells (Sg), sperms (Sp) and interstitial cells of Leydig (ISC). (**B**) Control group (Ctrl) showed few SOD2 immunostaining (arrowheads) in the spermatogenic cells (Sg) negative immunostaining in the sperms (Sp) and interstitial cells of Leydig (ISC). MSG group showed significantly increased SOD2 immunoexpression (arrowheads) in the spermatogenic cells (Sg) and interstitial cells of Leydig (ISC) and negative immunostaining in sperms (Sp). MSG + NSS group showed weak SOD2 immunostaining in the spermatogenic cells (Sg) and interstitial cells of Leydig (ISC) and negative immunostaining in the sperms (Sp). Positive GR or SOD2 immunoreactivity presented as a brownish color (arrowheads). Original magnification; (**A**,**B**) ×200, scale bar 100 μm.