Therapeutic Potentials of Ashwagandha Extract on the Toxic Effect of Benzo(a) Pyrene in Male Rats

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**Abstract:**

Benzo(a) pyrene is the first form of PAHs and is genotoxic and carcinogenic. This study was conducted to examine the potential therapeutic effects of levels of the extract of ashwagandha against testicular toxicity induced by BaP in rats. 30 mature rats were divided into 5 groups, (-) control group, BaP (10 mg/kg body weight), as (+) control BaP + treated with vit. E oral at a dose of 200 mg/kg body weight/day, BaP + AHE curative (1 ml /kg/day) and BaP + AHE curative (2 ml/kg /day) groups for 6 weeks. Many side effects were observed in animals injected with BaP such as loss of body weight, weakness activity and yellowish body hair. The results recorded a significant increase in body and testes weights, sperm count, sperm motility, serum levels of testosterone, luteinizing (LH), Follicle stimulating hormone (FSH), total antioxidants capacity (TAC), and (SOD) in the control-positive groups. And the groups curative with vitamin E and the levels of ashwagandha extract when compared to the negative control group, while a significant increase serum level MDA and luteinizing (LH) and in the BaP curative groups with vitamin E and the levels of ashwagandha extract compared to negative control group. Conclusions, administration at levels of ashwagandha extract caused ameliorative effect against BaP-induced testicular toxicity considered a powerful plant with health-promoting properties.

Key words: Withania somnifera, Curative, testosterone, testicular toxicity

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INTRODUCTION

Ashwagandha or Indian ginseng belonging to Solanaceae family which is also known as Withania somnifera. For almost 3000 years, it’s leaves and roots has been utilised in Ayurvedic medicine (Verma & Kumar, 2011). The plant is small woody herb, thick, straight that normally reaches a height of 30 to 50 cm. Ashwagandha considered as adoptogenic herb used to improve overall health and promote endurance (Winters, 2006). The leaves can have about 0.1m of length and the florent can be green or vivid and glaring yellow in shade; its pod appears tangerine in the complex when it is full-grown and the favorable month for implanting the seeds in between June and July (Tiwari et al., 2014). Withania somnifera is indigenous to Mediterranean countries of Africa, Southern Europe, and Western Asia and it is extensively scattered in parts of India, Pakistan, and Sri Lanka (Shrivastava & Sahu, 2013). Since time immemorial, the countless curative and medicative peculiar characteristics of this herbal plant is very well known to mankind. This plant renders aid in opposition to many afflictions and sicknesses like seizures, dullness, diabetes, and many more (Dutta et al., 2019). The plants roots and leaves are usually used for medicinal purposes. Ashwagandha belonging to the family Solanaceae is an herb with a height of 30 to 150 cm maximum (Sapra et al., 2020). Ashwagandha herbs are "Queen of herbs" because of its numerous beneficial effects. It’s used in ayurvedic medicines to promote enhance muscle strength and endurance, and improve overall health (Kulkarni & Dhir 2008 and Mishra et al., 2000).

Pyrene is a polycyclic aromatic hydrocarbon that burns at temperatures ranging from 300 to 600 degrees Celsius (Ranjit et al., 2018). Many ingredients can be found in foods, particularly grilled foods. The formula C20H12 is a benzopyrene, formed from a benzene ring fused with a pyrene. Epoxidediol metabolites known as BPDE interact. It is included in the first group of cancers before IARC (Zhu et al., 2014). Already known as the Mendelian virus. Benzpyrene (C 2 (/ 0) H 1 2) is a pentagonal aromatic hydrocarbon to which another benzene ring is added to the pyrene ring. When burning organic matter, large amounts of coal are produced.
Benzo[a]pyrene (BaP), and benzo[e]pyrene are both insoluble in water, soluble in perine in air, and have a melting point of about 180°C (Lin et al., 2018 and Gao et al., 2020). The study aimed to investigate the effect of the oxidative properties ashwagandha herbs caused by Benzo[a]pyrene (BaP), on sperm parameters, serum level of hormones parameters and serum activities of antioxidant enzymes for experimental rats.

**Material and Method**

**Material:**

**Ashwagandha (Withania somnifera):** Ashwagandha powder was obtained from the local market, cairo, Egypt.

**Rats:** 30 mature albino male rats of Sprague Dawley strain weighing 210±5 g from Laboratory of Animal Colony, Helwan, Egypt. Basal diet prepared according to (Reeves et al., 1993). The vitamin and mineral mixture prepared according to (Campbell, 1963).

**Drugs:**

**Vitamin E**: Alpha tocopherol, α TF was purchased from Pharco Company for Pharmaceutical, Egypt.

**Benzo(a)pyrene**: was obtained from Sigma Chemical Co. (St Louis, Mo, USA).

**Method**

**Chemical analysis:**

(a) **Ashwagandha extract (AHX)**

The ashwagandha powder (100 g) was dissolved in 1000 mL of ethanol (<99%) and kept at 27 °C for 24 h under continuous stirring, then filtered using Whatmann No. 1 filter paper. The filtrate was then evaporated to get concentrated filtrate. It was reconstituted distilled water to obtain the used dose of (AHX) according to (Elhadidy, et al., 2018).

(b) **Determination of Phenolic compounds of (AHX) extract**

Ashwagandha for HPLC analysis was performed using a waters 2487 HPLC system consisting of a dual λ detector and a Waters 1525 binary pump, and equipped with a Waters Symmetry® C18 column (5 mm, 4.6 ×
Therapeutic Potentials of ashwagandha extract on the toxic effect of benzo(a) pyrene in male rats

50 mm) with Waters Sentry universalguard column (5 mm, 4.6 × 20 mm) (Waters Corporation, Milford, MA, USA). Phenolic compounds of ashwagandha were studied using the reference HPLC method by comparing experimental retention times with reported reference values (Sakakibara et al., 2003).

Experimental design:

30 mature rats were divided into 5 groups of (n=6 rats) rats as followed: first group was fed on basal diet only and kept as control negative group, while groups (2, 3, 4 & 5) of rats (n=24) were injected (subcutaneous) one milliliter of toxic solution containing (10 mg/kg) benzo (a) pyrene (BaP) according to (Kallistratos and Fasske, 1976). Group (2) was left as positive control group, groups (3, 4 & 5) were divided into three curative groups:

Group 3: Positive control addition vitamin E of 200 mg/kg /b.wt./day by according to (Shalaby et al., 2004).

Group 4 and group 5: positive control addition with 1ml & 2 ml /kg /b.wt./day/rats ashwagandha extract (AHE). During the experiment period (6 weeks), the quantities of diet, which were consumed and / or wasted, were recorded every day. In addition, rat’s weight was recorded weekly, to determine food intake and body weight gain percent according to (Chapman et al., 1950).

Blood and Semen Sampling:

At the end of the experiment period, rats were anaesthetized by intraperitoneal injection of sodium thiopental (40 mg/kg). The testes and accessory sexual organs were removed and dissected out and weighed. Blood samples were withdrawn from the orbital plexs of veins of eye and the serum was separated after centrifugation. Serum samples were used for estimation of testosterone, FAH and LH levels. Semen samples were collected from cuda epididymis by cutting the tail of epididymis (cuda epididymis) and squeezing it gently in petri dish containing 0.5 ml of 2.9 % sodium citrate solution. Few droups of semen suspension were examined microscopically for epididymal sperm parameters. The testes, seminal
vesicles and prostate glands were dissected out and weighed. The left tested were quickly taken on ice till preparation of homogenate. The seminal content of epididymis was obtained by cutting of cuda epididymis using surgical baades and squeezed into a clean petri dish. The content was diluted 10 times with 2.9 % sodium citrate solution and thoroughly mixed to estimate the percentage of sperm progressive motility and sperm count as described by (Bearden and Fluquary, 1980). One drop of sperm suspension was withdrawn, smeared on clean glass slide and stained by eosin-nigrosin stain. The stained seminal smears were examined microscopically to determine percentage of sperm viability (ratio of alive/dead) and morphology as described by (Amann, 1982).

**Biochemical analysis of serum:**

Serum testosterone concentration was determined using Radioimmunoassay (RIA) method which is intended for the quantitative determination of total testosterone in the serum. The method is based on the competitive binding principal according to (Wilke and Utley, 1987). Levels of FSH and LH hormones in the serum were determined by an enzyme-linked immunosorbent assay (ELISA) using specific commercial kits as described by (Ballester et al., 2004). The determination of the activity of tissue antioxidant enzymes activities total antioxidants capacity (TAC), malondialdehyde (MDA) and superoxide dismutase (SOD), were determined according to (Nishikimi et al., 1972, Ohkawa et al., 1979 and Cao et al., 1993), respectively.

**Statistics:**

The findings were expressed as the mean ± SD. Statistical and correlation analyses were undertaken using independent One-way ANOVA with post-hoc tukey test and Pearson's rank correlation coefficient test, respectively. A $P$-value <0.05 was accepted statistically significant. All the previous statistical analyses of data were carried out by SPSS software ver. 17 (SPSS Inc., 2008).
Results and Discussion

The phenolic compounds of ashwagandha extract (AHX)

Data tabulated in Table (1) show that ashwagandha extract (AHX) contains some of phenolic compounds such as Flavonoids, Flavones and Polyphenols. The wavelength for determination each of Flavonoids, Flavones and Polyphenols were (489 nm, 612 nm and 335 nm) respectively. The experimental retention times were 56.4 min, 41.1 min and 24.2 min for Flavonoids, Flavones and Polyphenols respectively. While the standard retention times were 46.6 min, 25.3 min and 9.5 min for flavonoids, flavones and polyphenols respectively. The current study was similar to reports Udayakumar et al., (2010) and Balkrishna et al., (2020) who found that the AHX is a complex mixture of a large number of phytochemicals including phenolic compounds and flavonoids.

Table 1: Phenolic compounds of ashwagandha extract (AHX)

<table>
<thead>
<tr>
<th>Phenolic compounds</th>
<th>$\lambda^a$ (nm)</th>
<th>EtR$^b$ (min)</th>
<th>RtR$^c$ (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flavonoids</td>
<td>489</td>
<td>56.4</td>
<td>46.6</td>
</tr>
<tr>
<td>Flavones</td>
<td>612</td>
<td>41.1</td>
<td>25.3</td>
</tr>
<tr>
<td>Polyphenols</td>
<td>335</td>
<td>24.2</td>
<td>09.5</td>
</tr>
</tbody>
</table>

$^a$ wavelength for determination, $^b$ experimental retention time, $^c$ standard retention time.

Effect of different levels of ashwagandha extract (AHX) on feed intake, body weight and FRE of the experimental rats groups

The results showed that there were significantly decreases in the mean body weight, food intake and food efficiency ratio in BaP group induced testicular toxicity compared with normal control group. After BaP fed with either Vit. E or AHX levels, the increase in body weight, food intake and food efficiency ratio were significantly increased when compared with BaP group (P <0.05) (Table 2). It could be observed that group (5) had the high level of feed intake compared to other groups. The body weight of group (5) was 89.44±7.14 g while was 90.87±8.62, 51.62±5.11, 90.44±6.61g and 85.41±7.31 g for (negative control group, positive group,
vitamin E group and group 4) respectively. FER in group (5) was more than group (3) and group (4). These data may be due to the biochemical properties of ashwagandha extract (AHX) which acts as antioxidant agent and its pharmacodynamics. These results are in harmony with those obtained by (Rice-evans et al., 1995 and Biswal et al., 2013).

Table (2): Effect of ashwagandha extract (AHX) on feed intake and body weight gain and FER in rats

<table>
<thead>
<tr>
<th>Groups</th>
<th>Control (+ve)</th>
<th>Control (-ve)</th>
<th>Rats received benzo(a)pyrene</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Group 3 (Vit. E)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Group 3</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Feed intake (g/d)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>15.33±1.21</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>15.55±1.80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>15.65±1.27</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>15.15±1.41</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>15.04±1.80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>15.65±1.27</td>
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<tr>
<td></td>
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<td></td>
<td>15.15±1.41</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>15.04±1.80</td>
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<td>15.65±1.27</td>
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<td>15.15±1.41</td>
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<td>15.04±1.80</td>
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<td>15.65±1.27</td>
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<td>15.15±1.41</td>
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<td>15.04±1.80</td>
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<td>15.65±1.27</td>
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<td>15.15±1.41</td>
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<td>15.04±1.80</td>
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<td>15.65±1.27</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>15.15±1.41</td>
</tr>
</tbody>
</table>

Each means± standard deviations in the same row with different letters are significantly different (p ≤ 0.05).

Effect of different levels of AHX on relative weight of sexual of the experimental rats groups

Table (3) showed that the weight of testes in positive control group was significantly decreased 1.12±7.00 g compared to negative group; groups (3), (4) and (5) were 2.62±0.05 g, 2.29±0.01 g, 1.90±0.02 g and 2.03±0.04 g respectively. The weights of the prostate gland were 0.63±0.03 g, 1.05±0.01 g, 0.98±0.03 g, 0.90±0.02 g, 0.92±0.02 g in (+) control group, (-) group, vitamin E group, group 4 and group 5) respectively. The weight of seminal vesicle was significantly decreased in positive control group in compare to negative control group. Meanwhile, treating by different levels of AHX reversed the toxicity of BaP. A significant deficiency of this vitamin in the body of men leads to atrophy of the cells of the testicles.
Getting the antioxidant vitamin E may help improve the quality of men's sperm and protect it from damage, which increases men's overall fertility and improves their sexual health (Ulatowski and Manor 2013, Azzi 2018 and Khadangi and Azzi 2019). The sexual organs weight and sperm parameters of the experimental rats’ groups were clear that the group 5 was the best group compared to the positive group and less than control, these may be due to the effect of level of AHX which high content of phenolic and flavonoid and antioxidant activity. These results were agreed with (Sapra et al., 2020) which investigated the effects of the beneficial effects of ashwagandha in reproductive system. Ashwagandha leaves improves sexual function and sperm parameters in male rats by activation of Nrf2/HO-1 pathway while inhibiting the NF-κB levels (hanaa and Shalaby 2016).

**Table (3): Effect of ashwagandha (AHX) extract on relative weight of sexual organs in rats**

<table>
<thead>
<tr>
<th>Groups Parameters</th>
<th>Control (-ve)</th>
<th>Control (+ve)</th>
<th>rats received benzo(a)pyrene</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Group 3 (Vit. E)</td>
</tr>
<tr>
<td><strong>Seminal vesicle</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.79±0.01 a</td>
<td>0.35±0.02 c</td>
<td>0.65±0.03 a</td>
</tr>
<tr>
<td><strong>Testes</strong></td>
<td>2.62±0.05 a</td>
<td>1.12±7.00 c</td>
<td>2.29±0.01 a</td>
</tr>
<tr>
<td><strong>Prostate glands</strong></td>
<td>1.05±0.01 a</td>
<td>0.63±0.03 c</td>
<td>0.98±0.03 a</td>
</tr>
</tbody>
</table>

Each means± standard deviations in the same row with different letters are significantly difference (p≤0.05).

**Effect of different levels of AHX on sperm parameters of the experimental rats groups**

The effect of AHX on sperm parameters of the experimental rats’ groups was shown in Table (4). Treating with benzo(a)pyrene led to decrease in the count (10⁶/ml), viability (%) and motility (%) as it was
43.54±4.66, 42.92±2.13 % and 53.76±2.18% respectively in compare to negative control group. On the other hand, treating with different level of AHX has been reversed the toxicity of BaP in all the parameters. These results are in harmony with those obtained by (Legraverend et al., 2010) who noticed that BaP may cause reduction in fertility and decreasing in gonadal weights. Higher doses of BaP (40 mg/kg) caused almost complete sterility in both sexes of off spring (Ramesh et al., 2008). The best results of sperm parameters were recorded by group 5 that treated by 2ml AHX. Recent studies show that AHX is effective in increasing sperm count and sperm motility (motility) in infertile men. Another study found similar results, showing that AHX can significantly improve sperm count and motility. Spermatogenesis is a high-energy process that requires an optimal nutrition of antioxidants, minerals, and nutrients (Tripathi et al., 2021).

Table (4): Effect of ashwagandha (AHX) on sperm parameters in rats

<table>
<thead>
<tr>
<th>Groups</th>
<th>Control (-ve)</th>
<th>Control (+ve)</th>
<th>rats received benzo(a)pyrene</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Vit. E)</td>
<td>(1ml)</td>
<td>(2ml)</td>
</tr>
<tr>
<td>Count</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(10⁶/ml)</td>
<td>75.31±3.01 a</td>
<td>43.54±4.66 c</td>
<td>70.30±3.55 a</td>
</tr>
<tr>
<td>Viability</td>
<td>98.15±3.18 a</td>
<td>42.92±2.13 c</td>
<td>94.09±3.43 a</td>
</tr>
<tr>
<td>Motility</td>
<td>90.25±3.12 a</td>
<td>53.76±2.18 c</td>
<td>89.52±3.43 a</td>
</tr>
</tbody>
</table>

Each means± standard deviations in the same row with different letters are significantly difference (p≤0.05).

Effect of different levels of AHX on serum level of sex hormones of the experimental rats

Serum levels of sex hormones in experimental rats were shown in Table (5). The testosterone, follicle stimulating and luteinizing hormones and serum levels in rats of group (5) that treated by 2ml of AHX were found to be 34.74± 1.05 nmol/L, 161.00± 7.22 and 4. 68± 0.4 ng/ml respectively. These results were significantly increased than the positive group which was 18.22± 1.30 nmol/L, 103.16± 7.12 and 2.08± 0.2 ng/ml respectively. Indeed,
group 5 group 3(vitamin E) showed better results than group 4 and compared to positive control. A study conducted on rats showed that taking different doses of vitamin E daily for a period of months led to a significant increase in testosterone levels, while another study found that vitamin E supplementation affected the level of testosterone as a result of its deficiency (Miller et al., 2009 and Nicastro and Dunn 2013).

These results were in agreement with those obtained by (Smith et al., 2020) who found that course intake of ashwagandha root led to increase in serum testosterone concentration. There has been much research into the ashwagandha benefits on reproductive system, (Lopresti et al., 2019) studied the effect of a daily intake of 240 mg ashwagandha for 60 days on serum testosterone levels in men who found that there was an increasing in Total testosterone increased from 472.9 to 526.9 ±48.0 ng/dl. Ashwagandha has been considered a source of natural antioxidants for its polyphenol content and powerful antioxidant properties that cause diseases such as STZ-induced hyperglycemia and infertility that enhance testicular capacity, sperm count and quantity, levels of sex hormones, and levels of antioxidants in the blood. It showed an improvement in sperm count and testosterone level when taking ashwagandha, and it helped the body overcome problems caused by testosterone deficiency such as osteoporosis (Shah et al., 2015 and Smith et al., 2020).

**Table (5): Effect of ashwagandha (AHX) on serum level of testosterone, luteinizing (LH), and Follicle stimulating hormone (FSH) in rats**

<table>
<thead>
<tr>
<th>Groups Parameters</th>
<th>Control (-ve)</th>
<th>Control (+ve)</th>
<th>rats received benzo(a)pyrene Group 3 (Vit. E)</th>
<th>Group 4 (1ml)</th>
<th>Group 5 (2ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testosterone (nmol/L)</td>
<td>38.50±1.15 a</td>
<td>18.22±1.30 c</td>
<td>35.14±1.05 a</td>
<td>28.34±1.10 b</td>
<td>34.74±1.05 a</td>
</tr>
<tr>
<td>FSH (ng/ml)</td>
<td>164.02±7.03 a</td>
<td>103.16±7.12 c</td>
<td>160.09±6.04 a</td>
<td>151.76±6.05 b</td>
<td>161.00±7.22 a</td>
</tr>
<tr>
<td>LH (ng/ml)</td>
<td>5.19±0.4 a</td>
<td>2.08±0.2 c</td>
<td>4.99±0.4 a</td>
<td>4.26±0.4 b</td>
<td>4.68±0.4 a</td>
</tr>
</tbody>
</table>

Each means± standard deviations in the same row with different letters are significantly difference (p≤0.05).
Effect of different levels of AHX on serum activities of antioxidant enzymes of the experimental rats

The effect of different levels of AHX on superoxide dismutase (SOD), Total antioxidants capacity (TAC) and malondialdehyde (MDA) showed in Table (6). The positive control group treated with BaP showed significant decrease in levels of total antioxidants capacity (TAC) and superoxide dismutase (SOD) while significant increase revealed in level of malondialdehyde (MDA) in compare to negative control group. Obviously, treating with different levels of AHX reversed the toxicity of BaP. It was found that the rats treated by vit E and 2ml of AHX groups increased significantly in the levels of TAC and SOD (5.09±0.47µ/mg and 28.91 ± 3.61mmol/L) compared to positive group. Vitamin E is an antioxidant, as it eliminates free radicals in the body that attack cells and cause abnormalities in them, increasing the possibility of them turning into cancerous cells.

Table (6): Effect of ashwagandha (AHX) on serum activities of antioxidant enzymes in rats

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Control -ve</th>
<th>Control +ve</th>
<th>Rats received benzo(a)pyrene</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Group 3 Vit. E</td>
</tr>
<tr>
<td>Total antioxidants capacity (mmol/L))</td>
<td>6.16± 0.33^a</td>
<td>1.23± 0.12^c</td>
<td>5.85± 0.75^b</td>
</tr>
<tr>
<td>Malondialdehyde (µmol/g)</td>
<td>6.55± 1.44^c</td>
<td>12.41± 2.77^a</td>
<td>5.94± 1.42^b</td>
</tr>
<tr>
<td>Superoxide dismutase (µ/mg)</td>
<td>36.26± 7.01^a</td>
<td>18.41± 1.21^c</td>
<td>30.87± 2.11^a</td>
</tr>
</tbody>
</table>

Each means± standard deviations in the same row with different letters are significantly difference (p≤0.05).

These results were agreement with (Ruann and Hélia 2015). These data may be due to Ashwagandha root contains withaferin A, essential amino acid called tyrosine and sitoindosides VIIX. Those compounds show a high antioxidant activity via enhance and increase the superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase which play a vital role in scavenging the free radical and decrease the oxidative stress.
Ashwagandha root contains phenolic compounds and flavonoids (Bhat et al., 2015) that act as vital compounds in reversing and delaying the occurrence and development of tumors Withaferin A is the major constituent of AHX which has been used for active action against cancerous cells (Rai et al., 2016). The phenolic compounds and total antioxidant capacity found in ashwagandha plays a great role as an anti-inflammatory agent by decreasing the pro-inflammatory markers TNF-α. The most therapeutically important chemicals are Withanolides, particularly withaferin A and withanolide D, are the most therapeutically relevant compounds (Kalra and Kaushik 2017). Ashwagandha contributes to the recovery of sperm, its absorption of free radicals, with its very high antioxidant properties, it increases oxidation energies by BaP-infected sperms evidenced by the parameters of the restored sperm MDA level BaP reactivation due to H2O expulsion, reactivates the military oxidation defense level MDA. BaP reactivation due to H2O expulsion, reactivates the military oxidation defense (Smith et al., 2020). Vitamin E appears to strengthen lymphocytes, reduce production of the immunosuppressive prostaglandin E2, and reduce immunosuppressive serum lipid peroxides. Vitamin E has an anti-platelet effect, so it reduces their sticking to the walls of blood vessels and increases the efficiency of fertilization (Nicastro and Dunn 2013).

CONCLUSION

Feeding rats at concentrations (1 and 2 ml) and vit. E may significantly reduce oxidative stress and enhance sperm analysis, so this study recommends the use of AHX for male hormones, could be a potential bioactive therapeutic agent in control and management of in men.
References


Therapeutic Potentials of ashwagandha extract on the toxic effect of benzo(a) pyrene in male rats


الاحتمالية العلاجية لمستخلص الأشواجندا على التأثير السام للبنزوديبيرين

في ذكور الفئران

ناتسي يوسف التولى السيد عوض

المتخصص العربي:

بنزوديبيرين، أول من الهيدروكربونات النفطية متعددة الحلقات هو مادة مسرطنة سامة جينياً. أجريت هذه الدراسة لفحص التأثيرات العلاجية المحتملة لمستخلص الأشواجندا ضد سمية الخصية التي يسببها بنزوديبيرين في الفئران. تم تقسيم 30 فار ناضج إلى 5 مجموعات، كثنترول سالبة، بنزوديبيرين كثنترول موجبة (10 مجم/كلغم من وزن الجسم)، ومجموعة بنزوديبيرين عولجت بفيتامين E عن طريق الفم بجرعة 200 مجم/كلغم من وزن الجسم يوم/يوم. مجموعة بنزوديبيرين + مستخلص الأشواجندا المكون (1 مل/كلغم/يوم) ومجموعة بنزوديبيرين + مستخلص الأشواجندا المكون (2 مل/كلغم/يوم) لمدة 6 أسابيع. لوحظت العديد من الآثار الجانبية في الحيوانات المحققة بالبنزوديبيرين، مثل فقدان وزن الجسم وضعف النشاط وشعور الجسم المصاب. سجلت النتائج زيادة معنوية في أوزان الجسم والخصيتين، وعدد الحيوانات المنوية، وحركة الحيوانات النوية، ومستويات التستوستيرون في سرطان الدم، واللولتين، والهرمونات النبه للجريب (FSH)، والكثافة الإجمالية لضادات الأخصيد، وفقاً لكيسيد الديسموتوز. في مجموعات الكثنترول الموجبة، والمجموعات العلاجية بفيتامين E ومستويات مستخلص اشواجندا عند مقارنتها بالمجموعة الضابطة السالبة، بينما هناك زيادة معنوية في مستويات المولانالهيد واللولتين في سرطان الدم وفي المجموعات العلاجية بنزوديبيرين + فيتامين E ومستويات مستخلص الأشواجندا مقاومة للمجموعة الضابطة السلبية. الاستنتاجات: الحصول على مستويات من مستخلص الأشواجندا يسبب تأثيرًا محسناً ضد سمية الخصية التي يسببها بنزوديبيرين، والتي تعتبر نباً قويًا لخصائص تفعز الصحة.

الكلمات المفتاحية: أشواجندا، علاج، هرمون تستوستيرون، سمية الخصية.

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