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The Effect of the Intra Abdominal Pressure (IAP) Breathing

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Recently, breathing methods are drawing attention. There are some kinds of respiration methods from medical point of view, which are thoracic breathing, abdominal breathing, and thoraco-abdominal breathing [1]. People are usually breathing unconsciously with the manner of thoraco-abdominal type breathing[2]. Occasionally, we may have abdominal breathing on slow and calm situation in the case of yoga exercise or in the autonomous training of psychosomatic medicine. Furthermore, abrupt chest respiration can be found in the sports performances, such as hyperventilation of swimming athletes, and moderate distance athletic athletes such as 400m - 800m.

Furthermore, bronchial asthma can be cited as a disease where respiration is deeply involved in the pathophysiology[3]. There is characteristic breathing in asthma, wheezing or dyspnea are seen at the phase of expiration. For its care, there is a treatment method which deflates the mouth when exhaling the expiration air, which is called "mouth tattle breathing". The mechanism is to facilitate the discharge of air by increasing the pressure in the lumen of the lungs and bronchi during exhalation. In the case of children, music therapy can also be utilized[4]. While squirting breathing and singing a song with a long tone, the expiration is induce to easier breathing and comfortable way to increase the intra bronchial pressure.

Conventionally, a method of abdominal breathing is known. The inspiration causes the abdomen to bulge, and conversely, the expiration movement usually causes the abdomen to retract. In this case, putting the palm on the abdomen and pushing it all the way, a person can breathe out by expelling the air remaining in the lungs [5]. Just relaxing the respiratory muscles at this point, lots of air can be automatically entered into the lungs at once. Such a respiratory mechanism has been utilized in the relaxing or psychosomatic procedures so far.

On the other hand, it is "intra abdominal pressure (IAP) breathing" that is in attention at present[6]. It is different from other types of breathing, which are thoracic breathing, abdominal breathing, thoraco-abdominal breathing. The characteristic point is that both of breathing in and out constantly increase the pressure in the abdomen and harden the surrounded abdominal muscles. The abdomen does not become concave, even when a person is in the phase of expiration.

What is the intra abdominal pressure (IAP) like? There is a space called peritoneal cavity in the human abdomen[7]. It contains several organs such as stomach and liver, and the pressure in the abdominal cavity is called as IAP. It is a physiological trait changing regularly during various activities. As the peritoneal cavity would be a closed space, its volume may change according to respiration, muscle contraction and body position. When IAP is high, the breath is inhaled and the diaphragm covering the abdominal cavity is moved downward, associated with the decrease of the volume of the abdominal cavity. Since the abdominal cavity is compressed in this manner, the pressure in the abdominal cavity is increased.

What is the effect and influence of the increase of IAP? As IAP increases, the "body center" of the trunk and spinal column is supported as the axis of the body[8]. Then, the stability of the spine increases, and it is possible for a person to keep a good attitude to stand straight without any difficulty. Furthermore, the performance in the exercise and sports would be improved, because of the increased stability of the body trunk and waist in various movements.

As a matter of fact, we can maintain our posture in suitable position by holding the IAP to some degree [6]. In such case, the important point is the maintenance and formation of the center axis of our body [9]. When a person can stretch his abdomen with both his hands on the front, he can raise the consciousness of the center axis [9]. Further, authors continued instructing Masters Athletes for remembering of moving the center of the gravity smoothly and intentionally[10,11]. The guidance includes some important items, such as stable axis of the boy, flat and smooth grounding on feet, and prompt relaxing of knee with grounding. These factors exist on the basis of stable IAP.

There were several related reports. IAP was investigated in healthy young men, and IAP has a positive causal effect on hip extension maximal voluntary isometric contraction (MVC) torque [12]. According to the study for asymptomatic individuals, breathing exercise with sandbag showed efficacy on respiratory parameters and lumbar stability [13]. Respiratory pressure measurements and diaphragmatic electromyography (EMGdi) during exercise were studied in healthy men. The results showed that elastic binding of the abdomen (AB) was associated with acute improvements in neuromuscular efficiency of the diaphragm[14].IAP was studied in female subjects as to the relationship of CrossFit exercises[15]. IAP and pelvic floor support and function were studied, with the results that athletes did not have greater pelvic floor muscle strength compared to non-athletes, and that electromyographic activity increases substantially as running speeds increase[16].

As mentioned above, some benefits are obtained when IAP was maintained by proper respiration. In other words, since the pressure in the peritoneal cavity is held firmly, spinal stability and overall stability of the body are increased. Then, the unnecessary or useless tension of posture muscle is reduced. As the central axis is solid, subjects are not constantly strained [17]. According to less stressful situation, a person can increase internal sensitivity of the body, muscle spindle and spindle of tendon, and so on.

In summary, current topic of breathing was described. Abdominal breathing has been known so far. In contrast, IAP breathing has characteristic aspect that the abdomen does not retract during expiration. IAP increases spinal stability and improves motor function. Further research development is expected in the future among respiration, IAP, spinal stability and motor function.

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