Echronicon, vol. 3, 2021, pp. 150-167.

Cuidar a quienes cuidan Biopsicoeducación para el personal de la salud desde la Psiconeuroinmunoendocrinología (PNIE) y Psicoterapia Integrativa PNIE (PI PNIE) - versión original en inglés.

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ECRONICON OPEN ACCESS

EC NURSING AND HEALTHCARE
Review Article

Caring for those Who Care Biopsychoeducation for Health Care Personnel from Psychoneuroimmunoendocrinology (PNIE) and Integrative Psychotherapy PNIE (PI PNIE)

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Received: September 01, 2020; **Published:** February 27, 2021

Abstract

The Biopsychological Education technique provides knowledge for health prevention and is useful for health personnel, not only to transmit to patients but also for their self-care. In this development, aspects that composed Biopsychoeducation in terms of health protection factors are presented, incorporating healthy habits in basic daily behavior and social relations that aim to enhance resources and reduce risk factors for overall health. The Biopsychoeducation Workshops include relaxation techniques and are an opportunity to experience their healthy and shock-absorbing effects on states of anxiety and stress. It is important to consider that nurses as well as other health professionals are exposed to stress and risk situations of burnout, being these tools very valuable in self-care as well as to transmit to patients favoring their well-being that we know today has repercussions in the whole PNIE network.

Keywords: *Biopsychoeducation; Psychoneuroimmunoendocrinology; Psychoneuroimmunoendocrinological Integrative Psychotherapy*

Introduction

Health care workers are a vulnerable population, who are under constant stress as they have a caring role to play and often do not have sufficient healthy resources to counteract the harmful effects of this otherwise rewarding profession.

Multi-employment, lack of rest, the characteristics of the task and personality traits, are among other factors that can contribute to generating internal tension, wear and tear on homeostatic or allostasis systems, with repercussions on the health of this population.

Within the framework of care from the PNIE Integrative Psychotherapy that has been developed at the Hospital de Clínicas of the Faculty of Medicine in the Oncology Service since 1995, individual care and Biopsychological Education workshops are provided for patients and their families, as well as for nursing staff and radiotherapy technicians.

In 2019, a group of nurses, some of whom had already participated or were aware of workshops held in previous years, requested help in learning how to manage anxiety.

In Uruguay, within the National Integrated Health System, health personnel are considered a target population for mental health care.

Biopsychoeducation

Biopsychoeducation is a technique developed by Dr. Margarita Dubourdieu as part of the Therapeutic Strategy of Psychoneuroimmunoendocrinology (PNIE) in the different disciplines that adhere to this comprehensive transdisciplinary approach developed by the Latin American Federation of PsychoNeuroImmune Endocrinology (FLAPNIE).

This technique aims to educate in health and thus achieve a collaborative alliance to assess bio-social-emotional factors that affect their health and those that enhance it to seek strategies to modify the former and strengthen the latter.

It informs about the process of health illness from an integral and complex conception of the individual as a mind-body-environment unit. Many factors coming from different dimensions affect health and illness and therefore it will be said that it is Multicausal, and that it is important to take into account the body-mind-environment relationships.

At the same time, a Temporal Convergence takes place, because the bio-social-emotional history of the person is present in his/her current state, leaving circuits that facilitate manifestations and functioning in the present as well as future expectations produce a neurochemical cascade impacting on the person and his/her psychophysical state.

This gives evidence of multidimensional intermodulation, of the biological, cognitive, psycho-emotional, socio-ecological and spiritual dimensions. These 5 dimensions proposed by Dubourdieu M [1,2] and adopted by the Latin American Federation of Psychoneuroimmunoendocrinology (FLAPNIE) are considered in the practice of all health disciplines, in the Biopsychological Education, Diagnostic Evaluation and Treatment Phase.

As stated by Edgard Morín [3], knowledge must be relevant, i.e. related to its context, which in this case is taken into account when contextualizing the health process of the disease according to the data provided by the patient.

In this way, the patient will be able to know what the conditions are that led him/her to become ill to modify this situation with his/her active participation, to modify unhealthy bio-emotional factors, contributing to the adherence to treatments, prevention of complications or emergence of other pathologies and to incorporate or strengthen protective factors that will improve his/her well-being and quality of life.

In the Biopsychoeducation technique, the previously mentioned PNIE postulates of Multifactoriality, Temporal Convergence, as well as the concept of Epigenetics and Plasticity and gene and environment and bio-emotional intermodulations are transmitted. It is explained that a change in one system produces changes in the others and that history is present in the current state as well as expectations produce a neurochemical cascade and that we are not determined by our genetic background. The experiences of the individual can contribute to certain genes being silenced or expressed. It is also important to explain the concept of neuro and NeuroPNIE plasticity, the basis of the therapeutic alliance to promote modifications in unhealthy aspects and to reinforce neurotrophic circuits. In other words, it is possible to weaken pathogenic circuits and reinforce healthier circuits by facilitating new learning of how to function which, through repetition, forges long-term memories of new psychophysical and psychosocial behavioral patterns. Specific characteristics of the patient, his/her culture and environment are also taken into account to emphasize those aspects that are considered necessary according to each particular situation. The bio-psychography or Life psychography of each patient will provide data in this regard [4].

On the other hand, the Biopsychological Education Workshops are instances of exchange in which participants also make contributions and where the information provided takes into account the general characteristics of the workshop participants, or data collected through the application of surveys or data collection techniques before the workshops are held, etc.

It is necessary to clarify that besides the basic aspects about the functioning of the psyche-some-environment as an indissoluble unit and not determinism that make up the NSPE postulates, Biopsychological Education refers to any other contribution that contributes to health care and good biopsychosocial functioning.

In this sense, it is taken into account that nursing staff as well as other health professionals can integrate the contributions of Biopsychoeducation for their self-care as well as informing the patient about factors that may have contributed to, be present in or exacerbate symptoms favoring disease processes and conversely healthy factors that can enhance well-being, improve quality of life and favor adherence to treatments.

Integrative psychotherapy psychoneuroimmunoendocrinology (IP PNIE)

The PNIE and the IP PNIE were initiated in Uruguay in 1995 by Dr Margarita Dubourdieu, founder of the Institut of Formation Centro Humana and the Uruguayan Society of PsychoNeuroImmuneEndocrinology (SUPNIE) in 2002. Later, in 2008, Dr. Dubourdieu and Dr. Moguillevsky founded the Latin American Federation of PsychoNeuroImmuneEndocrinology (FLAPNIE). Dubourdieu, who is also a member of the International Society of Psychoneuroendocrinology (ISPNE), has pioneered the PNIE in Latin America and has developed a model of its clinical application in psychotherapy. This model has been adopted by the different FLAPNIE member countries and has been implemented in undergraduate and postgraduate programs at universities in Latin America and Europe. It has been translated into the transdisciplinary clinic through public and private hospital care teams in different areas such as gastroenterological oncology, psychiatry, endocrinology, children's clinic in asthma diabetes obesity and others among these clinical applications of PNIE since 1995 are developed Biopsychoeducation workshops aimed at patients, families, nurses, technicians and health personnel as well as educational institutions work and recreation.

From the IP PNIE it is understood that the health-disease process is developed in a Multicausal way, through a Temporary Convergence, because it does not obey a single cause or a single moment but several factors that interact in the individual. That is, what happens to the patient today has to do with a possible facilitation of past, present and future biological and psychosocial factors in a Multidimensional intermodulation of biological, cognitive, psycho-emotional, socio-ecological and spiritual factors. In this way, the approach from the IP PNIE allows a comprehensive vision and approach to the patient in a mind-body-environment unit.

According to Dubourdieu M [5] psycho-emotional factors are inherent to the individual and would be present in every health-disease process. Dissatisfaction of psycho-emotional needs or alterations produce stress responses, creating states of anxiety and/or depression.

In the new versions of stress proposed by Sterling [6], Mc Ewen [7,8] and Eyer, the stress responses set in motion systems that these authors call allostasis systems that are activated to recover homeostasis or dynamism homeostatic homeodynamics. The abuse of these systems due to their intensity or chronicity produces an allostatic load, a psychophysical effort with harmful repercussions on the PNIE network.

Stress responses are given through the activation of the neurovegetative system (SNV) and the hypothalamus-hypophilic-adrenal limbic axis (CL HHA), also involving other systems such as the gonadal and thyroid axis, the cardiovascular system, the level of glucose in the blood and general metabolism, and basal behavior, among others.

This journey would begin in the nervous system (NS) in the cerebral cortex where stimuli are cognitively processed and in the limbic system related to emotions. Responses to stimuli from the internal or external environment that are assessed as threatening are activated by automatic responses and if this activation is maintained, other adaptive responses are generated involving the endocrine system (ES) and the immune system (SI).

That is, in these responses to stress, a communication is established between the nervous system which has the function of maintaining the stability of the internal environment through regulation processes involving the Locus Coereleus and the hypothalamus and psychophysiological responses of the neurovegetative system and the endocrine and immune system.

From the SNV noradrenaline is released from the Locus Coereleus and the release of adrenaline from the medulla of the adrenal glands an SI inhibitor is active. In the endocrine axis, the Hypothalamus releases CRH (corticotrophic hormone releasing hormone) impacting the pituitary from where ACTH (corticotrophic hormone) is released which will produce the release of cortisol from the cortex of the adrenal glands, both axes being related to each other and in feedback.

Epistemological aspects of PNIE

The PNIE as a transdiscipline has a multidimensional vision of the health-illness process and is nourished by the contributions of General Systems Theory, Chaos Theory, the Complexity Paradigm, Stress Theory and Allostasis Systems. Capra F [9] propose in this sense, it can be said that the individual is a living system open to the social and ecological environment, with processes of self-organization in a dynamism-homeostatic homeodynamics way, that is, the search for a dynamic and flowing balance in the face of critical points of instability. These critical points are related to the process of health illness, understanding that this is related to the adaptation of the individual to internal or external demands with repercussions on the PNIE network, where intervention in some of the PNIE systems will have repercussions on the entire PNIE network.

As mentioned above, this deregulation can be produced by psychological factors that become stressors. In order to understand this path, the contributions of the Stress Theory and the Allostasis Systems are taken into account. On the Theory of Stress, the contributions of Dubourdieu M (2008) are chosen, who will say that stress is a term of the physics that would explain the property of the materials to receive impacts and to be modified. The different studies on stress refer to the capacity of the organism to maintain the internal balance, through response mechanisms to certain demands. The studies carried out in 1911 by Walter Cannon on the psycho-physiological responses to stress showed how there is a way of internal response to adapt and respond to demand by trying to maintain homeostasis through physiological activation by releasing adrenaline. Cannon's ideas were later taken up by Hans Selye, who elaborated on these stress responses and described in 1936 the General Adaptation Syndrome, which would be a non-specific pattern of response to adverse situations.

The general adaptation syndrome described by Hans Selye consists of 3 phases:

- 1st Phase of reaction of Alarm where the organism tries to give answer to the stimulus stressor with adaptive answers through the increase of cardiac frequency, breathing and arterial pressure, predominating a sympathetic activation of secretion of adrenaline and noradrenaline that would prepare the organism for the escape or alert.

- 2nd the Resistance Phase is triggered when the previous phase was not sufficient to adapt to the stressor stimulus and the activation of the neuroendocrine system continues, through the Hypothalamus-Pituitary-Adrenal axis with the hormonal production of glucocorticoids. This journey is accompanied by behavioral, cognitive and emotional changes. In the event that this phase continues and the previous responses are not sufficient to adapt to the stressor stimulus, the exhaustion phase will follow.

- 3rd Phase of Exhaustion is triggered by the chronicity of the previous phase, when over-adaptation is not sufficient and psychophysiological imbalances or maladjustments continue.

Later, Mac Ewen BS [10] will say that Allostasis is a process by which the organism tries to adapt to changes in order to maintain the stability or homeostasis of the body. Cortisol and adrenaline are said to be mediators of allostasis that participate in this process of change

to maintain adaptive homeostasis in situations of stress. When a return to the initial state is not achieved due to chronicity, accumulation or intensity, an allostatic charge is produced with a wearing down of these adaptive mechanisms of allostasis or balance and states of allostasis such as high blood pressure and alterations in the release of cortisol occur. If the activation of the allostasis systems continues to be abused, this leads to symptoms of allostatic overload with repercussions for the entire PNIE network.

Development of the PNIE

Dr. Solomon and Ader are considered the pioneers of psychoneuroimmunology. In 1987 the journal Brain Behavior and Immunity became the official organ of the PsychoNeuroimmunology Research Society. Through the work of Ader, Solomon and Cohen, the relationship between the nervous system and the immune system, and how it can be conditioned, was proven. In Latin America the term that unites the 4 PsychoNeuroImmune systems had its origin in the 90's at the Favaloro University in the PINE master's degree founded by J Badaraco (Psychiatrist), J Moguilevsky (Neuroendocrinologist), Daniel Cardinalli (Neurophysiologist) and Sinay (Endocrinologist). and later in 2008 with the foundation of the Latin American Federation of PsychoNeuroImmuneEndocrinology PNIE (FLAPNIE) from the call of Dr Moguilevsky and Dr. Psic. Dubourdieu in Montevideo-Uruguay.

Other contributions to be mentioned are the following bibliographical review by Fernández-Carballosa CR., *et al*. [11] who will say that the PNIE network is present in the therapeutic intervention given by specific and interrelated psychoneuroendrocrino-inmonological mechanisms. These authors carry out a bibliographic review on the NSPE where it is highlighted that Psychoneuroimmunoendocrinology began with the social contributions of George Engel, who in 1977, described a biopsychosocial model, giving importance to the individual from his consideration of psychological, biological and social factors. There, it continues with the contributions of Manolette, who in 2009, will say that thoughts, beliefs and feelings produce biochemical activity in the nervous system cells that communicate with the immune and endocrine systems, thus being able to modify the biology of these systems. Solomon's contributions are also mentioned, highlighting the interaction and communication between the brain, both from the mind and the behaviour, and the immune, endocrine, central nervous and autonomic systems, which are responsible for maintaining the homeostasis of the organism, according to Cabrera, Alonso, López E (2017). To this was added the consideration of Kelley, McCusker, 2014 and Honeyman, 2016, who will say that psychoneuroendocrineimmunology allows studying the mechanisms of regulation and control of the organism, through molecular signaling in chemically similar structures with receptors for the other structures or molecules of the other systems, within which neurotransmitters, neuromodulators, interleukins, cytokines in the immune system and hormones in the endocrine system are found.

Up to this point we have described those relevant aspects in the PNIE and the Biopsychological Education technique, where it is held that the process of health illness takes place as a way of adapting the individual to the multiple internal and external demands through psychophysiological responses, involving the interrelationship of the Nervous System (NS), Immune System (IS), Endocrine System (ES) and Psychological System given by our thoughts-beliefs, emotions, behaviors, physical and interpersonal environment and sense of life.

In this attempt of adaptation, many times, there is a certain abuse of the allostasis systems given by chronic stress factors where the functioning of the stress response axes with alteration in the PNIE network is altered.

Biopsychoeducation allows the creation of other healthier paths helped by Neuroplasticity and PNIE Plasticity and thus reversing some aspects of the health disease process.

The following is a description of some of the items presented at the Biopsychoeducation Workshop held in 2019 for the Health Personnel of the Oncology Service at the Hospital de Clínicas of the Faculty of Medicine of the UdelaR (Uruguay) and in the class given by Professor Claudia Escudero at the Postgraduate Centre of the Faculty of Nursing, where the importance of care for carers was highlighted.

Multidimensional approach

Next, a description of the different dimensions will be made separately where the important thing is their integral and complex understanding, within a process of health illness.

In this sense, the biological, cognitive, psycho-emotional, socio-ecological and spiritual dimensions are taken into account.

The biological dimension emphasizes the basal behaviors such as sleep-wake rhythm, exercise, relaxation, food, elimination.

Cognitive dimension: Thoughts, beliefs and cognitive distortions.

Psycho-emotional dimension: Emotions, interpersonal relationships, ways of coping, personality.

Social-ecological dimension: Social and physical environment from home, workplace, study, among others.

Spiritual dimension: Meaning of life, projects, philosophy of life, religious beliefs, motivations, values.

Biological dimension

Within this dimension, the state of the different systems and the basal conduct in their intermodulation with the PNIE network is considered.

Among the basal behaviors is the sleep process governed by the so-called circadian cycle, a term that comes from the Latin circa (around) Diano (day) which alludes to patterns that repeat approximately every 24 hours that govern the sleep-wake rhythm. When the circadian rhythms are altered, different functions are also altered, as an internal desynchronization is generated which is manifested through different symptoms [12].

This cycle is regulated by the alternation between day and night that is processed in the body through endogenous and exogenous mechanisms. Light is the exogenous signal that enters the organism through a kind of biological clock made up of the suprachiasmatic nuclei in the hypothalamus.

This biological process of interaction between sleep and wakefulness is influenced by different factors, including food, temperature, exercise and due to the current lifestyle, which is often far from nature and its daytime and nighttime light/dark rhythms, it has favored circadian rhythms.

It is now known that bright light in the morning is very important as an exogenous stimulus that synchronizes the circadian rhythm just as at night melatonin induces sleep.

At about 4 am the body temperature rises because cortisol prepares us for waking up as well as nature signals the start of daytime activity and conversely at sunset, nature becomes quieter, as the body temperature decreases around 7 pm with the release of cortisol preparing the body for rest.

In ancient times, daily life was governed by sunlight for the development of activity and rest at night, but nowadays, with electricity, 24-hour availability of food, and continuous stimulation by light devices, all this has contributed to the fact that these natural rhythms have been altered.

According to Dubourdieu M and Nasi ML [13] the sleep-wake rhythm is made up of 3 physiological states: wakefulness, slow or non-REM sleep (not rapid eye movements) and REM sleep (rapid eye movements).

During wakefulness there is a predominance of the functioning of the sympathetic system to counteract threats to the species, the immune system functions through humoral immunity against infection by releasing germs from wounds to repair tissues, there is increased blood pressure, activation of vasoconstriction to control bleeding, and food intake is regulated through the release of ghrelin.

The passage from wakefulness to sleep is induced by the hormone melatonin which helps to regulate other hormones by maintaining the circadian rhythm. This has antioxidant effects that counteract free radicals and strengthen the immune system.

Sleep is an active, heterogeneous and rhythmic process, during which two REM and non-REM cycles alternate every 90 minutes.

In the REM sleep stage some biological functions are repaired, a change in muscle tone is observed, thermoregulation is lost, cortical plasticity is strengthened and storage in the long-term memory is increased.

During non-REM sleep there is a predominance of parasympathetic functioning that functions as a brake on wakefulness, there is a reduction in blood pressure, the immune system reinforces its cellular immunity by strengthening the immune memory. Growth hormone GH and leptin, a hormone that provides a feeling of satiety, are also released.

Research now shows that people are sleeping 2 hours less than 40 years ago, with at least 8 hours of sleep being necessary for the proper functioning of the PNIE network [14].

When this sleep-wake rhythm is not maintained on a regular basis, alterations in different dimensions occur.

In the cognitive dimension there is a decrease in the capacity for attention, concentration, working memory, semantics and episodes, because during sleep memories and knowledge are consolidated, the passage from short-term to long-term memory occurs.

Fatigue interferes with the processing of executive functions, decision-making, with a decrease in creativity, productivity, capacity for abstraction with repercussions on security.

In the biological dimension there are changes in the metabolism of the thyroid axis with hypersecretion of cortisol.

The alterations of circadian rhythms in phase and amplitude favor the possibilities of developing metabolic syndrome, diabetes and obesity, cardiovascular disease, atherothrombosis, gastrointestinal diseases, neurovegetative damage.

Sleep and circadian rhythms influence the immune system. During sleep, the intercellular movement is facilitated and plays a fundamental role in the consolidation of the immune memory. When people do not sleep well, their immune memory is reduced, favoring inflammatory responses and associated diseases such as cancer, among others.

The decrease in the release of serotonin results in the appearance of headaches due to its vasoconstrictive function, predominantly depressed mood, listlessness, irritability, impulsiveness, pessimism, negativism.

An increase in noradrenaline to maintain a state of vigilance has repercussions on high blood pressure, increased heart and respiratory rates, contractures, gastritis, alertness and a threatening perception of the environment.

The metabolic alterations of the hormones ghrelin and leptin, which modulate the sensation of satiety and hunger, affect eating behaviour because when people do not sleep well, the body does not replenish energy adequately and seeks it out through caloric intake.

In the psycho-emotional dimension there is a deterioration in interpersonal relationships due to impulsive responses, anxiety, less tolerance to frustration and the spiritual dimension is altered by the lack of motivation, alteration of perception and maintenance of values and sense of life.

Broadly speaking, it could be concluded that a repairing sleep allows the organism to detoxify itself through nightly cleansing, reduce the risk of contracting diseases, enhance memory, favor a better state of mind and other health repercussions in the different dimensions of the individual.

Given the importance of sleep, it is necessary to carry out Biopsychoeducation taking into account the quantity, quality and chronobiology of this basal behavior.

Dubourdieu M and Nasi ML [15] suggest some advices referred by Dr. Daniel Cardinali for a better sleep.

Decrease contact with light screens. It is preferable to read paper version books, electronic devices without brightness (kindle), use of halogen bulbs.

Maintain a pleasant and cool temperature as the decrease in temperature induces sleep and excessive heat hinders good rest and a ventilated environment.

If you get up at night to go to the bathroom, it is advisable not to turn on the bright light instead, you can use a dim torch to avoid interfering with your sleep.

A room with few objects that emit electrical signals such as dim lights.

After 5 pm do not drink mate, coffee, tea or cola.

Eating away from sleep for 2 hours so that the digestive process does not interfere with rest. Keep regular schedules for going to bed and getting up.

Avoid sleeping during the day or taking a nap for no longer than 20 minutes.

Preferably exercise away from the rest time.

Take a bath with hot water before going to sleep because of its sedative benefits and practice relaxing activity before going to sleep, for example: reading a book, listening to relaxing music, warm social gatherings and/or relaxation techniques.

If you are unable to fall asleep, change your room and have a medical consultation.

Another basic behaviour to be considered in bio-psychoeducation in the biological dimension is food.

This behavior is related to food intake, fasting and energy expenditure. Its vital biological function is intermodulation by several dimensions, at the hypothalamus level where there is an orexigenic and anorexigenic zone regulated by the cortex, dopaminergic circuits, circadian rhythms, regulation of energy balance, sensations of pleasure, emotions, behavior and stress, among others.

Also, in nutrition it will be important to consider the quantity, quality and chronobiology.

Through food, the organism is provided with defenses, nutrients and energy. As for quantity, both excess and deprivation of food favor different alterations.

The defensive function of the organism is related to the composition of the microbiota that forms part of the intestinal flora.

Probiotic and prebiotic foods stabilize the intestinal flora and enhance the anti-inflammatory activity of the intestinal system. These include vegetable proteins, vegetables, fruits, soya, pulses, fruits, aromatic herbs, omega-3s and fish.

The PNIE network can be helped by the intake of foods with antioxidant capacity, among them are polyphenols, which are chemical substances found in some plants as phytonutrients. They have an antioxidant capacity because they capture the free radicals produced by oxidation, which is the contact with oxygen that favors cellular aging. Other foods with antioxidant capacity are found in legumes, turmeric and green tea. Other foods that strengthen the immune system are those rich in Zinc and Selenium which are found in fish, seafood, poultry, nuts, dairy products, rice, whole meal bread, Vitamins C, D, citrus and vegetables.

The behaviors that favor the health process are cleaning and consumption of fruits and vegetables, the intake of water to eliminate toxins from the organism.

Decrease the consumption of salt, sugar and flour to promote the absorption of nutrients and a good rest. Reduce as much as possible the consumption of sugars and carbohydrates during the night because the insulin in rest diminishes its action and these foods are not metabolized and remain deposited as body fat.

As well as in sleep it has been seen how some basal behaviors impact on its development, such as eating and exercise, elimination and relaxation this also occurs at a food level and between all behaviors.

In this sense, the importance of the relationship between eating behavior, physical activity and rest are is taken into account, as shown by some research which emphasizes that these aspects function as risk factors in some NIPP alterations.

Rojas P, Labbe M, Huneeus A, Quiroga F [16] mention in their work on hypothalamic amenorrhea that the risk factors to avoid are the deficit in the energy balance, eating behavior disorders, exercise regulation and stress management.

Another aspect to highlight is the relationship between food and anxious behaviour as described by Cepeda-Vidal - V, Mondragón-Portocarrero A, Lamas A, Miranda JM, Cepeda A in their work on "Use of prebiotics and probiotics in the management of anxiety" [17]. There it is stated that when there is a diet with high fat content, it modifies the intestinal microbiota with presence of dysbiosis, generating deterioration of behaviour with increase of anxious behaviour. This favors the development of pathologies such as obesity, depression, anxiety and neurodegeneration. In this way, the two-way relationship between the psychological stressors of the biological dimension of food and the psychological and emotional factors of anxiety can be observed.

Regarding the quality of the diet today, the benefits of the Mediterranean diet are known, restricting the consumption of red meat and carbohydrates and increasing the consumption of vegetables, legumes, fish, white meat, nuts, omega 3, pasta, rice and olive oil, among others. Where possible, it is suggested that white flour be replaced by whole meal, reducing the intake of sugar, salt and flour, maintaining the appropriate level of vitamin D, water consumption, limiting alcoholic and sweetened drinks. These suggestions should be combined with exercise, rest, relaxation, elimination and good interpersonal relationships.

Another aspect that is considered in Biopsychoeducation in the biological dimension, is exercise. It refers to any activity that involves the muscular and skeletal structure that has a specific objective, it also refers to physical activity that relates to any movement with an energy expenditure and to sport that involves physical activity with rules and competition [18].

In ancient times there was not a programed exercise as there is today, because the days were impregnated by a lot of activity, developing hunting and facing environmental vicissitudes. But in modern life, a large dose of sedentarism has been installed which has negative consequences on health, not only favoring overweight, obesity, metabolic alterations but also affecting the immune system and the psycho-emotional level.

Exercise is as important for health as rest, food, relaxation and elimination and each one has repercussions on the others.

The WHO [19] states that exercise helps to maintain a stable weight and reduces the risk of cardiovascular, pulmonary, immune, metabolic diseases, musculoskeletal disorders and psychological disorders. Inactivity is the 4th risk factor for the development of disease processes.

When carrying out these activities it is important to take into account the quantity, quality and chronobiology.

Dubourdieu M and Nasi ML [20] explain that some of the protective effects on the whole PNIE network are: regulation of blood pressure, heart and respiratory rate, the digestive system, the endocrine system, the immune system, increased performance of cognitive, concentration and memory capacities; global vision; increased decision-making; irritability, improved quality of sleep. Exercise increases muscle mass and helps maintain bone density, improves lung capacity.

Exercise is also important because of its relationship with other basal behaviors as shown by the following research on modulation of appetite as shown in the review by Gomez Escribano, L, Gálvez Casas A, Escribá Fernández-Marcote A R, Tárraga López P and Tárraga Marcos L [21]. Where it was observed that participants who practised exercise had lower food intake because exercise reduces the hormone ghrelin and increases insulin and leptin levels with an impact on satiety and food intake.

On the other hand, we take into account the review article by Acevedo-Triana CA, Ávila-Campos JE, Cárdenas LF [22] who state that exercise improves the cognitive processes observed in academic performance and mood. These effects of exercise can be explained through the increase of Levels of serotonin and tryptophan involved in cell neurogenesis improving cognition, memory and mood.

The dopaminergic activity that is involved in attention tasks, working memory and behavioral inhibition.

The release into the blood of noradrenaline and adrenaline which impact on the hypothalamus, hippocampus and limbic areas, improving memory processes and the activity of the vagus nerve.

Acetylcholine levels that impact on blood flow in the cerebral cortex and hippocampus, this improves cognitive functions, such as spatial memory that depends on the hippocampus by increasing acetylcholine levels.

The activity of brain-derived neurotrophic factor (BDNF) also has antidepressant and mood-regulating effects.

As can be seen, the importance of exercise in biopsychoeducation lies in the multiple health benefits throughout the PNIE network. Although health personnel are often limited in incorporating this healthy habit due to multi-employment, among other reasons. Moderate exercise could be recommended, avoiding sedentary behaviour. As a suggestion it could be raised:

- Incorporate the habit of walking
- Use stairs instead of the lift.
- Avoid the use of the car, public transport, in short distances.
- Implement physical activity whenever possible.
- Dancing in your free time.
- Answering the phone on foot.

- Take recreational walks, talk to friends on foot instead of sitting down for coffee.
- Every 15 minutes make an interruption by standing up or changing posture or small stretches.

It is currently recommended that you get 150 minutes of moderate aerobic exercise per week or at least 75 minutes of vigorous aerobic exercise. Aerobic exercise means walking, dancing, cycling, skating, riding, canoeing, yoga [23].

Within the biological dimension, it is important to incorporate relaxation techniques that can counteract the hyperstimulation to which the individual is exposed today, and which impacts on his or her health in a negative way. This hyperactivation generates a greater state of alert with repercussions on the entire PNIE network through the release of adrenaline and cortisol that allows adaptation to this demand.

Relaxation techniques allow the internal tension generated by this hyperstimulation to be released, regulating sympathetic and parasympathetic activity by acting at the level of the SNV and this will also improve the PNIE network.

There are various relaxation techniques, including deep diaphragmatic breathing techniques, guided meditation techniques, visualization techniques, Jacobson's progressive relaxation techniques, mindfulness or full attention.

The important thing is to choose the one that allows you to experience its benefits in a pleasant way.

To exemplify some of these, we take the contributions of Simon V [24], on Mindfulness, which is a practice of vipassana meditation that focuses on the importance of developing full attention, centered on the rhythm of the breath. In this work, several investigations are cited where the results show that people who practice Mindfulness have some neurobiological changes at the level of the pre-frontal cortex that translate into the development of a positive affective style with a greater disposition to affection, openness to novelty, improving the capacity for empathy, sustained attention and beneficial effects on immunity.

These techniques have multiple benefits over the entire PNIE network that can be incorporated into daily life to improve health.

Within the biological dimension, the importance of the elimination function is also included, which plays a very important role in the elimination of waste from the body and in the state of mind. This is why we include a chapter on its relevance in Biopsychoeducation.

In this sense, we take the contributions of Dubourdieu M and Nasi ML [25] who express that due to the accelerated pace of the 21st century it is frequent that functions such as feeding, sleeping and elimination are affected due to lack of time. These authors highlight the incidence of cultural and socio-ecological factors which often do not take into account this biological function, generating alterations in the whole PNIE network. They also mention the work carried out in the Gastroenterology Service of the Hospital de Clínicas of the Faculty of Medicine of UdelaR (Uruguay), where the importance of elimination with the associated mood and behaviour was observed.

Some of the suggestions will consider its association with other basal functions present in the biological dimension such as:

- A diet rich in fibre obtained from vegetables and cereals, which favors the dragging function in the intestine and improves the absorption of nutrients through the intestinal mucosa.
- The consumption of water which helps to purify the body by eliminating toxins.
- Restorative rest and relaxation techniques that bring well-being to the organism by allowing some regulation of its specific functions.

Cognitive dimension

Moving on to the cognitive dimension, it will be said that it relates to thoughts, beliefs and cognitive distortions. In the work of Biopsychoeducation, special interest will be placed on those cognitive aspects that generate discomfort and suffering in the patient because this increases the activation of the neurochemical cascade of the stress axis with the consequent alteration of the PNIE network.

According to Aaron Beck [26] and Albert Ellis [27], it is said that the meaning given to a situation will determine what a person feels.

In some cases, cognitive distortions are errors in information processing. Some examples are: over-generalization where a conclusion is reached from a single element, maximization and minimization of certain situations, personalization that alludes to the self-referentiality of events, polarisation in an all-or-nothing vision, catastrophic vision of situations. These cognitive distortions lead to behaviors by them and a neurochemical cascade by stress responses.

It is also important to consider that thoughts are related to beliefs that generate discomfort because of their rigidity, interfere with people's interests and have repercussions on behavior, interpersonal relationships activating responses to stress due to the dissatisfaction and frustration they generate.

The importance of work in the cognitive dimension lies in detecting those thoughts, beliefs and cognitive distortions that generate discomfort in order to work on them by means of a technique called Cognitive Restructuring. Through this technique distorted thoughts and irrational beliefs are identified, which are analyzed, confronted and relativized, and new alternatives of more adaptive thoughts are sought.

In this sense, de Laconich E [28] carried out work on "Effectiveness and Neurophysiological modifications of the Neurocognitive Restructuring". His work aimed at determining whether neurocognitive restructuring produces changes in the computerized electroencephalogram (CEGE) in patients with psychiatric pathology. Here it is considered that the observation of the cerebral cortex can inform about the evolution in these patients. Neuroimaging and neurocognitive studies allow us to assess modifications in the dynamics of brain processes. The results show that the intervention during 6 months with cognitive restructuring produced modifications in the frontal and temporal areas which are areas associated with behavior and emotion where the meaning given to the events is processed. Some studies coincide with the changes in brain chemistry through the modification of information processing that is achieved with CBT. Also Kandel (1999) suggests that psychotherapy favors lasting changes in behavior through learning that produces alterations in gene expression by changing synaptic connections.

For this reason, the IP PNIE has incorporated into the cognitive dimension the contributions developed by Beck and Ellis with regard to the identification of distorted thoughts or irrational beliefs and the Cognitive Restructuring Technique which is added to other interpersonal techniques developed from the IP NSPT to enable other forms of emotional cognitive processing.

Psycho-emotional dimension

On the psycho-emotional dimension, it will be explained that it refers to emotions, interpersonal relationships, ways of coping and personality, among other aspects. Bio-psychoeducation in this dimension will aim to make known the emotional process and its relationship with the health-disease process, according to the characteristics of each case.

Dubourdieu M [29] will say that Biopsychological Education, in this dimension, will aim to make the patient understand the importance of including, together with the review of biological and mental factors (thoughts), psycho-emotional and bonding factors.

It starts with the consideration that the individual, from a complex and integral vision, is formed by interpersonal experiences throughout his/her life. In this sense, it is important to consider the circuits that facilitate responses that are created according to past and present

individual and interpersonal experiences that make sense for each patient. It is also important to know how to discern strategies that allow change or empowerment according to whether they are healthy or harmful experiences.

PI PNIE works with the technique of Biopsychography which serves to make this journey, knowing at each stage the interpersonal environment given by the presence or absence of people who officiate or officiate in an empathic way with their needs for protection, attachment, to contribute through these interpersonal experiences to the satisfaction or dissatisfaction of current needs and desires.

The modes of interaction and response to the environment create ways of coping. In this sense, it can be said that the healthy way will be the one that allows adaptation to a situation in a flexibly and creatively. On the other hand, the unadaptive way of coping will be the one that does not allow to solve the demand that originates it and generates a psycho-physiological activation with answers in the axes of stress.

Fernández Abascal E [30] states that the way of coping according to Lazarus and Falkman is associated with the personal resources that are activated when faced with a demand and that these can be adaptive or maladaptive, according to the personal characteristics of the individuals and the situation. These authors argue that the psychophysiological activation associated with the emotional process will be determined by the subjective perception of the situation and not by the situation itself.

The capacity to confront will allow the person to adapt to the situation, and this capacity can be directed towards the problem or towards the emotions. The capacity to face the problem is related to the subjective evaluation of the situation and the possible personal resources to face the problem. The capacity to face the emotions would be directed to an attitude that would contemplate the beliefs, motives or desires that promote the problem in order to value it from one's own behaviour and skills to face it. This can lead to behaviors that are focused on diminishing the negative emotional impact of an event or are focused on solving the problem. The PNIE considers that both should be combined, that is to say, attenuate states of anxiety by means of medication or relaxation techniques, but it is also important to look for strategies to modify the causes that generate this state.

On the other hand, Planes M [31] takes the studies of Lazarus and Folkman to conclude that individuals who are vulnerable to stress, try to impose their will when the condition is experienced in a threatening way, have an intense working life, and their social relations are dominated by aggressiveness and dominance. In these cases, there will be a hyper-reactive way of coping where there is little cognitive flexibility and their opinions are overvalued.

In this same sense, López Rossetti D [32] quotes Rosenman and Friedman in their description of what they call Type A Personality, characterized by a constant search of efficiency accompanied by high competitiveness where the others cannot perform the tasks as they do, they would also show certain tendency to egocentrism, hostility and execution of multiple tasks simultaneously. This type of personality is considered self-stressing because its psychological aspects do not allow it an effective coping mechanism creating a certain psychobiological predisposition to stress with a higher probability of developing cardiovascular diseases.

Also, Fernández Abascal E [33] will say that in the Model of Psychophysiological Reactivity proposed by Smith and Brown 1991 and Smith and Christensen 1992, individuals are hostile, have a threatening perception of the environment that generates hypervigilance activating cardiovascular and neuroendocrine responses more easily, lack protective resources by maintaining scarce interpersonal contacts and healthy behaviours. The Transactional Model proposed by Smith and Pope highlights that hostile individuals present stress due to their way of perceiving reality, helped by thoughts and actions that weaken interpersonal contacts and social support. Another classification made by Lazarus and Falkman is the hyporeactive passive coping mode where there is difficulty in communicating thoughts and emotions. This type of behaviour could be associated with the description of possible fight-or-flight stress responses among which the paralysis or freezing response similar to hyporreactivity is described.

In this sense, Fernández Abascal E [34] cites the works of Weinberger, Schwart and Davidson, 1979 and Cano-Vindel 1994 who propose to talk about a 'repressive style of confrontation', with a tendency to repress unpleasant emotions with repercussions on the immune system. Also Gross and Levenson, agree on this association between emotional inexpression and illness, which has been explained using the hydraulic model that suggests that when an emotion is repressed it comes out through another channel, as could be the expression of an illness. Denollet (1998) also characterises the D-type personality as vulnerable to cardiovascular disease with social inhibition and negative affectivity such as depression, anxiety and anger.

It is also important to identify other personality traits that are not adaptive, histrionic traits of indirect affect demand, obsessive traits or others described in the DSM - Diagnostic and Statistical Manual of Mental Disorders, or that can also be identified through personality tests or inventories.

In other words, these models make it possible to observe the alterations in the PNIE network associated with the communication or non-communication of emotions, modes of coping, personality characteristics, self-demanding, rigidity, repression of emotions, among other aspects. In this sense, aspects of biopsychic functioning and defenses are also taken into account, which are also described in the Biopsychoeducation workshops. Among these, alexithymia, over-adaptation and poverty of illusions stand out.

Dubourdieu M [35] refers that alexithymia, a term coined by Sifneos 1972, refers to the non-expression of desires or needs, over-adaptation where the needs and desires of others are prioritised to the detriment of one's own; poverty of illusions refers to the absence of projects and visualisations towards the future. These disadaptive defenses have a psychic and bio-emotional register that, by not allowing communication of what is happening to the patient, generates experiences of discomfort, frustration with activation of the neurochemical cascade of response to stress.

This is worked on in depth in the IP PNIE. In the Biopsychological Education Workshops, different strategies will be offered, among which the importance of developing Assertive Communication stands out. This aims to communicate the thoughts, emotions and experiences generated in interpersonal relationships, giving rise to an open, direct dialogue that respects one's own and other people's intentions and avoids confrontation, making it possible to exchange opinions without losing the communication objectives that gave rise to it. As an example, one could say "what you do makes me feel this way, I would prefer such a thing".

As a protective factor, it is also important to highlight the role played by emotional bonds and supportive social networks as buffers for stress responses.

Social-ecological dimension

In the socio-ecological dimension, those contextual aspects where the life of the individual takes place will be highlighted. In this sense, the social, cultural and physical-environmental environment is taken into account, in the knowledge that it can act as a generator of discomfort or well-being. Bearing in mind some aspects that have already been worked on in other dimensions, the importance of generating healthy interpersonal or environmental meeting spaces with repercussions on the entire health of the patient and, in this case, the health staff, could be recalled.

Many times cultural beliefs, customs or prejudices can condition the appreciation of situations in a rigid way and generate stress responses. In these cases, it will be important to be able to contribute to making them more flexible in order to better adapt and relate to others. In this sense, the culture of the 21st century lifestyle and the presence of technology can also lead to its misuse, affecting interpersonal communication, promoting consumerism, immediacy, addictive behaviour and other functions that will be important to evaluate and modify if they are harmful.

Social aspects include economic factors that can impact on whether or not individuals' basic needs are met.

With regard to ecological and physical environmental aspects, it is important to highlight the importance of housing, work and health institutions in terms of their healthy characteristics. Visual, olfactory and lighting aspects and contact with nature will be taken into account.

In this sense, it is taken into account that light and dark have an impact on the regulation of circadian rhythms and metabolic processes that have an impact on the entire PNIE network.

Dubourdieu M and Nasi ML [36] bring some research where it has been observed that making rest intervals for nurses in a natural garden or in a room with plants contributes to the reduction of stress [37].

In the same way, the beneficial effects of gardening on rehabilitation and the view of nature through windows have been seen [38].

Similarly, fewer hospital stays have been observed in patients from whose windows nature was observed, a decrease in pain medication, complications and more positive states [39-41].

It has also been observed that grounding, direct contact of the feet with the surface of the earth, sand, grass, provides a sense of well-being, due, among other things, to the fact that it favours ionic balance.

Spiritual dimension

This dimension addresses aspects related to values, motivations, projects, expectations, religious and transcendental beliefs that will function as protective or harmful factors in case of absence. In this sense, the presence or absence of these factors will be seen in the establishment of harmonious or conflictive relationships, commitment or apathy with the social and environmental environment, motivation or inhibition of personal growth.

According to Dubourdieu and Nasi ML [42] the spiritual dimension can operate in a harmonious or disorganizing way in the psychosoma unit.

The work carried out between Spain and Brazil by [43] Bueno Bejarano de Medeiros AY, Nencetti Pereira Rocha RC, Ramos Pereira E, Costa RM, Andrade Silva R, Gil Moncayo FL. concludes that the meaning of life improves the spiritual well-being and quality of life of patients undergoing cancer treatment and of nursing staff, both in their self-care and in the search for meaning in life of the patients.

In another study carried out by Fontes De La longuiniere, A. C., Donha Yarid, S., Sampaio Silva, E. C. on the "influence of the religious/spirituality of the health professional in the care of the critical patient" [44]; it was concluded that health professionals who have some religious or spiritual belief have a concept of the disease process that influences their relationship with the patient, the care provided, their interpersonal relationship, quality of life and physical well-being.

According to the relationship of several dimensions, it could be said that healthy behaviors are generally observed in people who have a sense of life, hope with clear objectives of self-care and protection towards themselves and others.

Motivation, sense of life and values that harmonize would be generators of positive stress with the corresponding neurochemical cascade raising the basal tone of serotonin [45].

There are some strategies and techniques that contribute to the development of states of greater harmony such as meditation and mindfulness techniques and dynamics that contribute to the development of gratitude. In this sense, some studies have shown that gratitude favors a greater subjective well-being, diminishes states of stress and favors a good social relationship [46].

Conclusion

By way of conclusion, it will be said that the IP NSPE considers Biopsychological Education to be part of the therapeutic strategy, and it should be clarified that the insight or awareness of adverse or protective aspects of health is a necessary first step, but not sufficient for changes to take place. Strategies will also be needed to make these changes a reality in daily life. In this sense, it will be said that it is not enough to reduce states of tension or anxiety from only one dimension, for example, through medication or relaxation techniques. It will be necessary to modify those factors that generate these states and promote professional help in any area that is required.

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