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Evaluation of Pain and Fear Associated with Putting on the Stereotactic Frame in Patients Planned for the Biopsy of a Brain Tumour with the Possibility of the Pharmacological Alteration

Ocena bólu i lęku związanego z założeniem ramy stereotaktycznej u pacjentów planowanych do biopsji guza mózgu z możliwością modyfikacji farmakologicznej

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Abstract

Introduction. Results of the intensive development of the research on the pathogenesis of tumours of the nervous system allow increasingly to understand the nature of illnesses, contributing to the development of effective methods of their treatment. Taking sample material for the pathomorphology examination by means of the stereotactic biopsy is a method widely applied in the diagnostics of brain tumours. The diagnostic methods carried out are associated with the pain and fear felt by the patient during the operation. The pharmacological alteration will allow to minimize pain and fear while putting on the stereotactic frame.
Aim. The aim of the study was the comparative evaluation of level of pain and fear perceived by patients while having the stereotactic frame put on for the biopsy of a brain tumour as well as the assessment of the effectiveness of pharmacological measures applied before performing the stereotactic biopsy.
Material and Methods. Research was carried out at the Clinic of Neurosurgery in the 10th Military Clinic Hospital with the Polyclinic. The research included a group of 60 patients, who were subject to stereotactic biopsy of brain tumour. Our own questionnaire of surveys, evaluation of pain on the VAS scale and the standardized questionnaire form of self-assessment — STAI X-1 and STAI X-2 were the research tools.
Results. Having examined the research group of 60 patients — a dependence on the applied premedication, gender and individual age groups was observed. No relation between feeling pain as well as fear were observed regarding the domicile and the level of education.
Conclusions. On the basis of an analysis conducted in age groups towards examined factors it is possible to notice positive effects of Dormicum application compared to the group patients without the premedication. In the case of patients, in whom giving medicines was not applied it is possible to notice an increase in the parameter of fear along with age, contrary to the situation in the group examined where Dormicum was being applied. Ketonal had no effect on changes in the parameters examined. In none of examined groups a relation between the age and the level of pain feeling measured on the VAS scale was indicated. **(JNNN 2016;5(1):21–27)**
Key Words: pain, fear, biopsy, stereotaxis, stereotactic frame

Streszczenie

Wstęp. Wyniki intensywnego rozwoju badań nad patogenezą guzów układu nerwowego pozwalają w coraz pełniejszym stopniu zrozumieć istotę choroby, przyczyniając się do opracowania skutecznych metod leczenia. Pobieranie materiału do badania patomorfologicznego za pomocą biopsji stereotaktycznej jest metodą szeroko stosowaną w diagnostyce guzów mózgu. Przeprowadzane metody diagnostyczne łączą się z odczuwaniem przez pacjenta bólu oraz lęku podczas zabiegu. Modyfikacja farmakologiczna pozwoli zminimalizować ból oraz lęk podczas zakładania ramy stereotaktycznej.

Cel. Celem pracy była ocena porównawcza poziomu odczuwanego bólu oraz lęku u pacjentów podczas założenia ramy stereotaktycznej do biopsji guza mózgu oraz dokonanie oceny skuteczności podawanych środków farmakologicznych przed wykonaniem biopsji stereotaktycznej.
Materiał i metody. Badania zostały przeprowadzona w Klinice Neurochirurgii w 10 Wojskowym Szpitalu Klinicznym z Polikliniką. W przeprowadzonych badaniach uczestniczyła 60-osobowa grupa pacjentów poddanych zabiegom biopsji stereotaktycznej guza mózgu. Narzędziem badawczym był autorski kwestionariusz ankiet, ocena bólu za pomocą skali VAS oraz ankieta standaryzowana samooceny STAI X-1 oraz STAI X-2.
Wyniki. Po zbadaniu 60-osobowej grupy badawczej zaobserwowano zależność od stosowanej premedykacji, płci oraz poszczególnych grup wiekowych. Nie zaobserwowano zależności odczuwania bólu oraz lęku w stosunku do miejsca zamieszkania oraz wykształcenia.
Wnioski. Na podstawie analizy w przeprowadzonych grupach wiekowych w stosunku do badanych czynników można zauważyć pozytywne efekty stosowania Dormicum w porównaniu do grupy pacjentów bez premedykacji. U osób, u których nie podjęto podawania leków można zauważyć wzrost parametru lęku wraz z wiekiem, a odwrotną sytuację odnotowuje się w grupie badanej z podawanym lekiem Dormicum. Na zmiany w badanych parametrach nie miał wpływu Ketonal. W żadnej z badanych grup nie wykazano zależności między wiekiem a poziomem odczuwania bólu mierzonego w skali VAS. **(PNN 2016;5(1):21–27)**
Słowa kluczowe: ból, lęk, biopsja, stereotaksja, rama stereotaktyczna

Introduction

In recent years an intense development of the research on the nosogenesis of tubers of the nervous system has been observed. Its results increasingly allow to understand the nature of illness, significantly contributing to the development of effective methods of treatment. The great majority of cancers of the nervous system are located intracranialy i.e. 80–90%. According to cancer wards given to the Centre in Warsaw the incidences of primaeval brain tumours with reference to the Polish population amount to rates respectively 6.6 — women, 7.9 — men/100 thousand/year.

This rate is rising along with age. Among small children under the age of 5 it is approximately 2.5/100 thousand/year, whereas in the group aged over 55 it is about 20/100 thousand/year [1,2].

A brain tumour is a very wrong tissue developing in the skull which normally is filled up entirely by the brain. These changes can be of gentle or malicious character, both kinds being life-threatening. Malignant tumours of the brain can give distant transport, some changes can develop without symptoms, others are leading quickly to the end of their life.

The presence of wrong mass within the skull is a condition of the appearance of general clinical symptoms which reflect increased intracranial pressure, as well as manifestations of focal lengths, resulting directly from damaging the defined structures in the brain. In the case of brain tumours it is necessary to take into account histologic type, degree of the malice as well as the nature of the tumour growth.

Clinical symptoms are usually not very specific. In some cases even a little bump often triggers heavy neurological disorders. However, manifestations more often appear when the pathological change is already really significant. One of methods of taking the sample material for the purpose of pathomorphology examination, successfully applied in the diagnostics of brain tumours is stereotactic biopsy which involves taking the fragment of the changed tissue from the determined location of the brain [3–6].

The stereotactic method enables a very precise and accurate access with surgical instrument to the pathological changes located deep inside of solid tissue with the minimal damage of the surrounding healthy tissues. It enables to carry out a sequence of diagnostic and healing treatments which include: taking tissue samples for the purpose of histological examination.

The development of neuroendoscopy and neuronavigation makes it possible to operate accurately within intracranial spaces under control of eyesight and enables precise placement of the surgical instrument towards the image of the computed axial tomography or the magnetic resonance in the real time. The basis of stereotaxy is a statement of Descartes according to which in the space it is possible to determine putting every point with the arrangement of three mutually perpendicular axes of coordinates of purpose.

For the needs of the stereotactic biopsy an outside frame of reference is used and the stereotactic frame is attached to the head of the patient [7–9].

The computed axial tomography is performed to a patient. In a CT picture there is a visible cut in two heads and four groups for three points, from the centre of which there are outlining the X axes (horizontal) and Y (vertical), and extreme — distance from the plain of the frame (coordinate from).

Modern stereotactic systems are conjugated with a CAT scanner and coordinates of the purpose are determined directly from the CT image. The patient during the treatment lies on the moving operating table, on which the stereotactic frame is being put on, locating CT examination is performed and the treatment itself is conducted [10,11].

The diagnostic methods conducted are associated with the pain and fear felt by the patient during the implemented treatment.

International Association of Studying Pain (IASP) defines unpleasant, sensory and emotional experience accompanying the existing or threatening tissue damage or referring to such damage.

Pain is a subjective feeling, which means that it contains everything that the sick person associates with the term "pain" irrespective of objective manifestations associated with it [12]. Pain is a sensory experience, associated with the effect of the damaging stimulus as well as coming into existence based on psychological interpretation of the occurrences taking place, modified by previous experiences and psychosomatic conditioning [13].

Fear is defined as a group of emotional reactions freed by incentives themselves both from the inside and outside of the organism. These reactions are characterized by the fact that they have a negative colouring, are perceived by the individual as something unpleasant and severe which is not possible to be got rid of as well as connected with physiological reactions such as the accelerated heartbeat, increased blood pressure, muscle tension [14,15].

Analysing concepts it is possible to state that fear is an unpleasant emotional state being characterized by persistent feeling of peculiar distress which is accompanied by irrationality and helplessness [16,17].

The purpose of this work was to make a comparative evaluation of the level of pain and fear experienced by patients while the stereotactic frame was being put on for the biopsy of a brain tumour as well as to assess the effectiveness of certain pharmacological centres before performing the syereotactic biopsy.

Material and Methods

In the examination a group of 60 patients of the 10th Military Clinic Hospital with the Polyclinic were categorised to stereotactic biopsy of a brain tumour. The patients were divided into three groups.

The first group consisted of those to whom pharmacological means were not applied. The second group contained the patients to whom Dormicum was given orrally up to 7.5 mg before the treatment. In the third group there were patients to whom Ketonal of 100 mg was given intravenously before the treatment. All groups consisted of an equal number of patients.

For the purpose of conducting research the questionnaire form was used: evaluation of pain with the VAS scale and the standardized questionnaire form of the STAI X-1 self-assessment and STAI X-2 (Table).

Table. Group of examined patients

Patients		
The group without premedication applied	The group with Dormicum applied	The group with Ketonal applied
⬇		
Assessed		
STAI X-1	STAI X-2	VAS
⬇		
Statistical analysis with the use of Statistica 10.0		

The data analysis was conducted based on the Statistica 10.0 software package, from the own questionnaire towards the results gained from the sheet of the STAI self-assessment and the VAS scale of feeling pain.

Results

For the purpose of conducting the comparison the ANOVA Kruskal-Wallis test was applied for details on the non-parametric disintegration, independent of itself, carried out for comparing more than two examined groups. Conducting a test allowed to answer whether the type of the applied treatment has a statistically significant impact on the number of points scored in the STAI X-1 questionnaire, STAI X-2 and on the VAS scale of pain.

The first comparison which was carried out for determining differences in the number of points scored on the STAI X-1 scale, STAI X-2 and the VAS scale conducted among the three examined groups from which the first control group, was the groupwhere no medicine was applied, and in the case of two remaining Dormicum and Ketonal treatment were applied.

In the conducted comparison statistically significant results were received only in the case of the evaluation of the parameter among the examined groups on the VAS scale (Figure 3). The most interesting fact is that in the case of Dormicum taking patients the received results were the lowest. For the scores achieved for the STAI X-1 parameter (Figure 1) STAI X-2 (Figure 2). there are no noticable differences among the examined groups of patients.

In the case of a change of the STAI X-1 for parameter of patients who did not receive premedication it is possible to notice the increase of this variable along with the age of patients. The youngest patients felt the lowest fear whereas the oldest patients felt the highest fear (Figure 1). In case of the patients who received the Dormicum premedication a fall in the examined STAI X-2 factor is observed according to age (Figure 2).

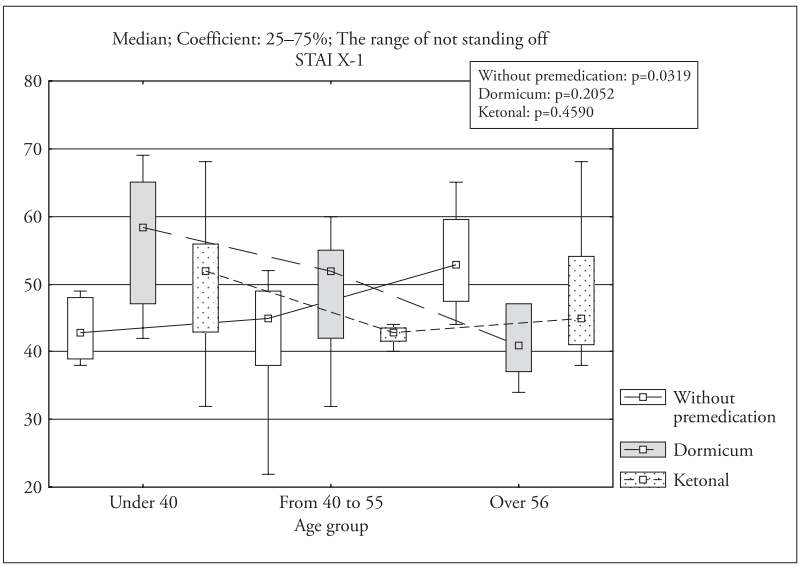

Figure 1. Changes of the STAI X-1 parameter depending on the age group and the applied premedication

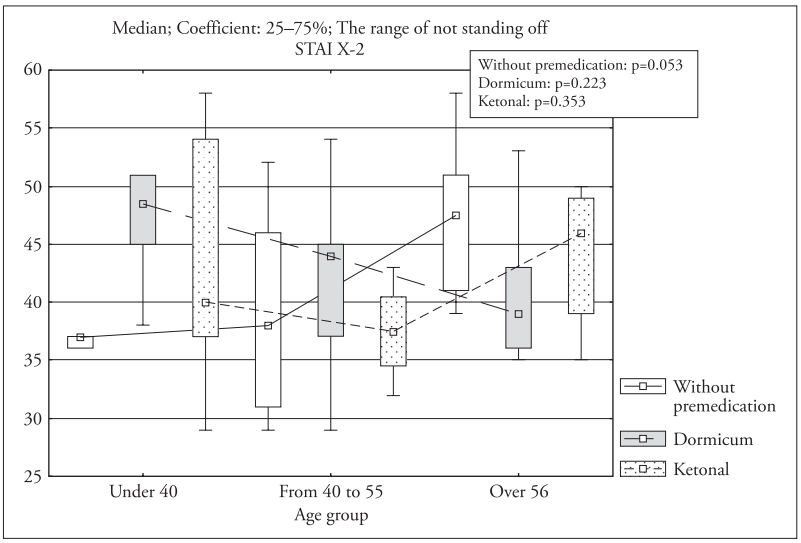

Figure 2. Changes of the STAI X-2 parameter depending on the age group and the applied premedication

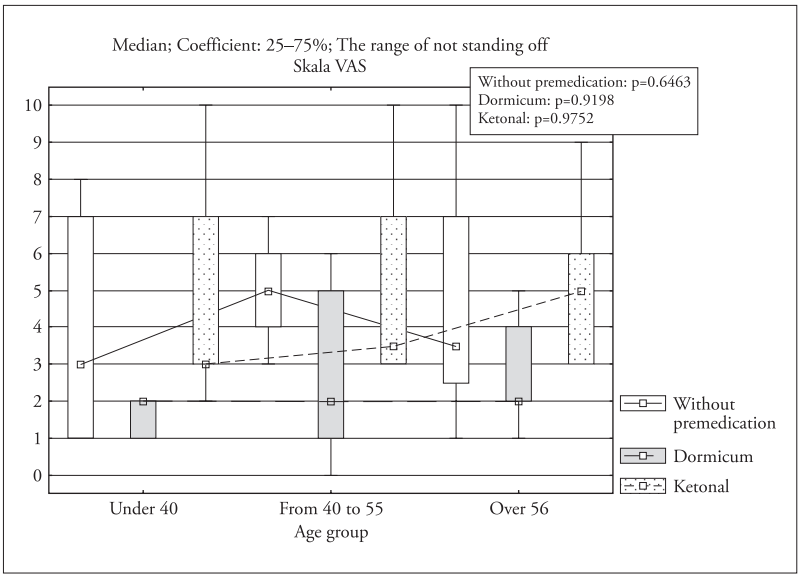

Figure 3. Changes of the VAS parameter depending on the age group and the applied premedication

The conducted ANOVA Kruskal-Wallis test of significance shows that the differences appear to be statistically significant in the case of those patients who did not receive premedication.

In the analysis carried out with the division according tothe gender the results received were below the assumed threshold of the statistical significance for parameters STAI X-1 and STAI X-2 (Figure 4 and 5). In the case of the evaluation of pain, there appears on the VAS scale a correlation between the parameter tested and the gender (Figure 6). It is possible to notice that there appears to be no difference regarding fear between most women and men not-accepting medicines whereas such a difference is noticeable in the case of subjective feeling of pain.

Apparent relations between the number of points scored in the STAI questionnaire and the evaluation of VAS pain according to the gender of those examined were shown in the conducted comparison of patients who had been subject to the Dormicum treatment. In the analysis carried out, the received results were above the assumed threshold of the statistical significance for all three parameters.

However, it is possible to notice the apparent statistical tendency regarding the points for the evaluation of fear in the case of the scores gained in the STAI X-2 sheet with the division into groups. Even though in the case of the two remaining parameters (STAI X-1 and VAS) no important differences were identified, it is possible to notice that the results obtained by women are higher. That can suggest that men react better to Dormicum than women do (Figure 5).

In the performed analysis, where Ketonal was being given to patients we obtained results above the assumed threshold of the statistical significance in the case of the evaluation of pain whereas for STAI X-1 and STAI X-2 parameters differences between women and men differ in the statistically significant way. For the conducted analysis it is possible to observe that men better react to Ketonal and results for all three analysed parameters are lower than for the group of women accepting Ketonal (Figure 6).

When analysing patients in terms of their gender it turns out that in the case of women and men statistically significant changes appear in the STAI X-1 questionnaire form only when Ketonal was applied, for the remaining cases generally no change has been observed.

In the STAI X-2 questionnaire form men to whom Ketonal was applied scored fewer points and there is a significant difference (Figure 5). Considering all remaining cases, the differences have not been statistically significant.

It is possible to notice that in the case of the division made according to the gender criterion, men had lower results than women for the examined factors, and those differences have often been statistically significant. They appeared in the situation when medicines were given to both groups. As regards the analysis where the premedication was not applied, women achieved better results than men and it is them who had lower results, a statistically significant difference appeared in analysis of pain feeling on the VAS scale.

The largest differences observed, appeared between women and men accepting Ketonal (Figure 6).

In the case of a change of the STAI X-1 parameter of patients who did not receive the premedication it is possible to notice an increase of this variable along with the age of patients. The youngest patients felt the lowest fear whereas in the case of the oldest its level was the highest (Figure 1).

Conducted Kruskal-Wallis ANOVA test of significance shows that statistically significant differences appear in patients who did not receive the premedication. In the case of those who received the Dormicum premedication a decrease of the examined STAI X-1 factor is observed along with age (Figure 1).

Considering the VAS scale, in the examined groups there was no relation indicated between the age and the level of feeling pain and no statistical relations have appeared (Figure 3).

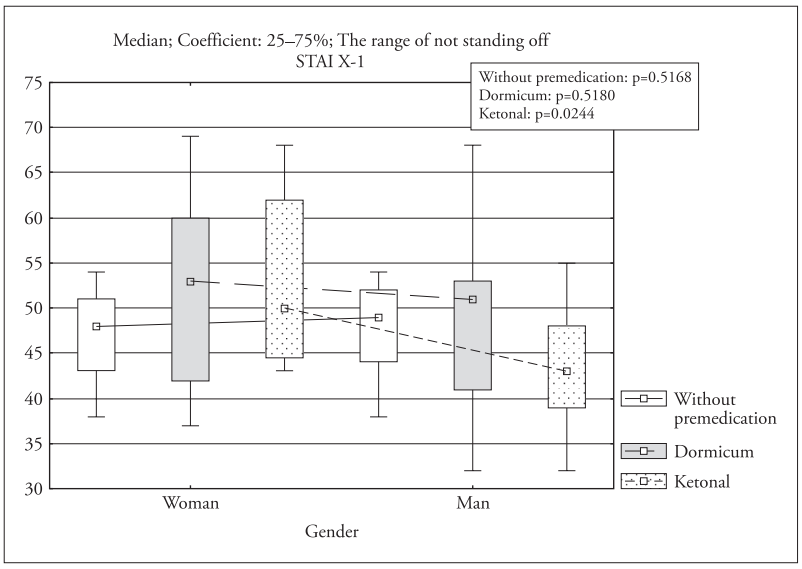

Figure 4. Change of the STAI X-1 parameter depending on the applied premedication and the sex

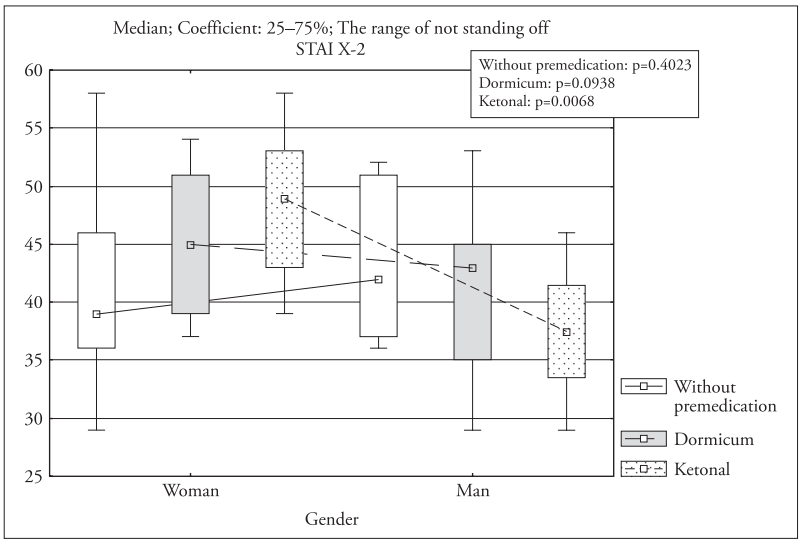

Figure 5. Change of the STAI X-2 parameter depending on the applied premedication and the sex

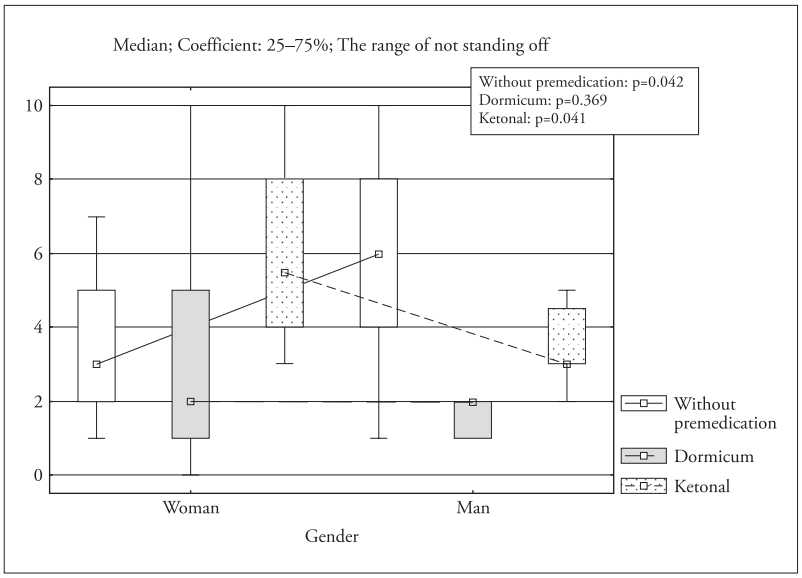

Figure 6. Change of the VAS parameter depending on the applied premedication and the gender

Discussion

Stereotactic method permits the biopsy its precise execution, an access to the pathological changes done to brain tissues located deep inside with the minimal damage to correct surrounding tissues as well as enables to conduct a sequence of diagnostic and healing treatments. Treatment taken is connected with pain felt and fear experienced by the patient during its performance.

Many researchers refer to the fact that the predisposition to reacting with fear is an inborn property, and learning of fear when appropriate incentives freeing the first stronger reactions of fear will work.

From the research conducted by Pawlak [18] it is possible to conclude that the parameter of fear in the perioperative period is correlating with age, therefore deliberate perception of the feeling of anxiety and fear is conditioned on the age of the patient and is sustained at a high level.

Therefore, proceedings of painkilling and reducing the feeling of fear during the process of executing medical procedures, not only are really important and justified for humanitarian reasons but also because of stopping the development of the entire series of pathophisiological processes. They concluded that particular attention should paid to patients with higher feeling of fear and one should take due actions in order to minimize this factor for the purpose of the possible improvement in the perioperative care.

Perski [19] describes increased appearance of perioperative complications in combination with the continually increased factor of fear and depression. On the basis of studies of patients carried out on the group, where the relation of the appearance of fear and the age was being examined, they concluded that the observed parameter had kept at a high level and its experiencing increased along with the age of patients.

Fear is a developing factor in the awareness of patients indicating high increase of this parameter in the perioperative period. Based on the research conducted by Alexander [20] it is possible to come to the conclusion, that the level of fear in the examined patients remained at a high level.

In the examinations carried out in groups of patients an effect of the age on the level of fear was being taken into consideration, and the highest level was also stated among two parameters examined. Therefore, the proceedings aimed at the reduction of feeling fear while executing medical procedures, are really important and justified not only for humanitarian reasons but also because of their contribution to the entire process of patophisiological changes [21–24].

Based on our own research it can be stated that among patients who did not get medicines it was possible to notice the growth of feeling fear along with age, and the opposite situation is being observed in the group surveyed where Dormicum medicine had been applied.

The Dormicum application has no effect on the level of feeling pain with the division made according to the gender criterion.

Statistically significant differences appear when there are analysed patients without the premedication as well as those to whom before putting the frame on Ketonal was given.

In the first case of patients without the premedication it is noticable that male patients feel the stronger pain in a statistically significant degree. However, the situation is quite the opposite in the case of Ketonal application, where women experience pain stronger than men do.

The results of the analysis of studying pain experienced while fixing the sterereotactical frame has his confirmation in research which was carried out in 2010 at the same clinic [25].

After examining the group of 60 patients a dependence on the applied premedication, the gender and individual age groups was observed. A relation of feeling pain as well as a medicine were not observed in reference to the place of residence and education.

They confirm the obtained results, that applying exclusively a local anesthesia before putting the stereotactical frame on does not eliminate feeling of pain by the patient. Only giving premedication or Ketonal depending to the gender and age can reduce this unpleasant emotion.

Conclusions

In the research group where before putting the stereotactical frame on, the patients had received Ketonal statistically significant changes were not observed in the case of patients in all sorts of age groups. It is possible to notice that the examined STAI X-1 factor is of similar value in all groups. The patients who received Ketonal scored the similar number of points in every age group. The largest differences noted appeared between women and men receiving Ketonal.

In case of the STAI X-2 sheet in the group of the patients to whom the premedication had not been applied it is possible to observe the growth of the number of obtained points along with the increase of the age. These changes are at a statistically significant level.

Among people who did not receive medicine it is possible to notice the increase in the parameter of fear along with age, whereas the opposite situation is being recorded in the group examined with the Dormicum medicine applied.

In the three conducted correlation analyses of the age towards the factors studied it is possible to notice positive effects in the case of Dormicum in comparison

to the control group (patients without the premedication).

A relation of the baulk was shown in none of examined groups with the age but the level of felt pain measured on the VAS scale.

Implications for Nursing Practice

Widely applied diagnostic methods conducted with the stereotactical biopsy for the purpose of taking samplematerial for the patomorphological examination are connected with pain and fear being experienced by the patient during the performed treatment.

Monitoring the complaint by the nursing staff applying a therpy individually adapted to every patient feeling pain and feeling fear will let effectively minimize it and affect the frame of mind during the treatment.

The participation in the pharmacological alteration will permit to minimize both pain and fear while putting the stereotactic frame on.

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(A — Concept and design of research, B — Collection and/or compilation of data, C — Analysis and interpretation of data, D — Statistical analysis, E — Writing an article, F — Search of the literature, G — Critical article analysis, H — Approval of the final version of the article)
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