

Analysis of the impact of age and work experience on palpation skills of visually impaired and sighted massage therapists

Analiza wpływu wieku oraz stażu pracy na zdolności palpacyjne u masażystów z dysfunkcją wzroku oraz masażystów widzących

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Key words

palpation examination, palpation skills, visually impaired

Abstract

Introduction: Palpation is a basic diagnostic tool. However, difficulties in obtaining unambiguous results make it less reliable. Questions about the reliability of palpation are still valid. The abilities of people who use this type of examination and factors which affect palpation must also be taken into consideration.

Aim: Analysis was conducted by means of an experimental study without randomisation. Its aim was to determine the influence of age and work experience on the palpation skills of massage therapists.

Materials and methods: 58 people were studied. They were divided into 2 groups. The first group consisted of 45 massage therapists (students or practitioners). The control group consisted of 13 people with no massage experience. The studied people were subjected to the "hair test", the "weight test" and the measurement of Static Two-Point Discrimination (STPD) within the thumb-middle fingertips, the thenar and hypothenar.

Results: The level of STPD worsens with age in the index and middle fingertips. In the study group, work experience positively influenced the "hair test" and STPD within the thumb and the index finger. In the other tests, the factor of age and work experience did not determine the results.

Conclusions: In the research, it is indicated that there are factors affecting palpation skills. However, it is not possible to observe the influence of the analysed factors in each test. This is due to a variety of tests and areas to be measured. Work experience was considered a factor positively affecting palpation skills. Age was considered a factor worsening the tested abilities.

Słowa kluczowe

badanie palpacyjne, umiejętności palpacyjne, niewidomi

Streszczenie

Wstęp: Palpacja jest podstawowym narzędziem diagnostycznym. Jednak występujące trudności w uzyskiwaniu jednoznacznych wyników i ich rejestracji zmniejszają jej wiarygodność. Ciągłe aktualne są pytania o rzetelność palpacji, nasuwają się także pytania o predyspozycje osób wykorzystujących to badanie, o rodzaj czynników wpływających na palpację oraz o możliwość ich modyfikacji.

Cel: Przeprowadzona analiza była badaniem eksperymentalnym bez randomizacji mającym na celu określenie wpływu wieku i stażu pracy na zdolności palpacyjne masażystów.

Materiał i metody: Przebadano 58 osób, które podzielono na 2 grupy. Pierwszą grupę stanowiło 45 masażystów (uczniów lub praktyków). Do grupy kontrolnej zakwalifikowano 13 osób niezwiązanych z masażem. W celu określenia zdolności palpacyj-

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nych respondenci poddawani byli testowi włosa, testowi wagi oraz pomiarowi dyskryminacji dwupunktowej (STPD) w obrębie opuszek palców I-III, kłębu i kłębiku.

Wyniki: Poziom dyskryminacji dwupunktowej pogarsza się wraz z wiekiem w obrębie opuszki palca II i III. W badanej grupie staż pracy wpływał pozytywnie na rezultaty testu włosa oraz poziom dyskryminacji dwupunktowej w obrębie kciuka i II palca. W pozostałych testach czynnik wieku i stażu pracy nie warunkował wyników.

Wnioski: Głównym wnioskiem płynącym z badań jest to, iż istnieją czynniki kształtujące zdolności palpacyjne. Jednakże nie w każdym teście można zaobserwować wpływ analizowanych czynników na uzyskane wyniki. Jest to spowodowane zróżnicowaniem testów i obszarów poddanych pomiarom. Na podstawie badań staż pracy uznano za czynnik wpływający pozytywnie na zdolności palpacyjne. Wiek został uznany za czynnik pogarszający testowane zdolności.

INTRODUCTION

Palpation examination is a commonly used diagnostic method. It is applied in a special way by massage therapists, physical therapists and osteopaths when assessing bone or myofascial structures. This study plays a significant role in the area of so-called "soft manual therapy", which may include, for example, fascial therapies, trigger point therapies, deep tissue massage, and so on¹. There is a significant increase in the number of courses, training and workshops dedicated to this subject. The number of units educating in faculties such as physical therapy, osteopathy and massage is also increasing. Mass training of people, however, raises some questions, e.g. about the predispositions of candidates to obtain optimal learning outcomes, the order of training or the requirement to attend introductory courses, e.g. a palpatory anatomy course. These threads are important because they take the selection of candidates and the way they are effectively educated into consideration. It should be noted that appropriate education affects the level of service and, consequently, the formation of opinions about the entire professional group. Palpation has many disadvantages along with its many advantages. This test was considered by scientists as unreliable. As Karel Lewit wrote, "we face a paradoxical situation: the clinical method, which provides the richest and most diverse information, has a subjective stigma, which has no scientific basis. It is difficult to accept, considering that even the most perfect diagnostic instrument is at best only a miserable copy of the sophisticated system that creates the human brain, nervous system and receptors for hands being exam-

ined by palpation"². This state of affairs has further consequences. If the usefulness of the sense of touch in diagnostics is called into question, it may undermine the validity of therapeutic concepts and strategies created on its basis. Consequently, there is a justified need to conduct research and objectify knowledge regarding the sense of touch and palpation.

STUDY AIM

In the study, it was attempted to determine factors and their influence on the precision of touch. The main purpose of the presented work was to examine the impact of age and experience on the level of palpation skills. The following research questions were posed:

1. Does experience affect the palpation skills of visually impaired and sighted massage therapists
2. Does age affect the palpation skills of those included in this study?
3. Can the level of palpation skills of visually impaired and sighted massage therapists be freely shaped and how can they be modified?

MATERIALS AND METHODS

Research was carried out at the Post-Secondary Integrative Therapeutic Massage School No. 2 in Krakow, the National Section of Blind Massage Therapists and Physiotherapists, Małopolska Branch and at the "Złote Rączki" Social co-operative of visually impaired massage therapists, Krakow, Poland. Data were collected in March and April 2017. The subjects were divided into two groups. The first group comprised massage therapists. Individuals not

associated with massage were qualified into the control group. The massage therapists were not divided according to degree of visual impairment because this factor did not differentiate the group.

Criteria for inclusion in the study were:

- 20 to 50 years of age,
- completed or undertaken education in the field of massage or physical therapy,
- consent of the subject to carry out the tests.

Criteria for inclusion in the control group:

- 20 to 50 years of age,
- no education related to massage or physical therapy,
- consent of the subject to carry out the tests.

Exclusion criteria from the tests:

- age below 20 and above 50 years of age,
- superficial or deep sensation disorders,
- lack of consent to perform tests.

58 people participated in the study (43% women and 57% men). The study group was dominated by two age groups, those aged 21-25 (43%) and 26-30 (43%). 8 people (14%) were qualified for the 31-35 age range. The study group included 45 people (78%) who took up education or had education related to massage, and 13 people (22%) not related to this industry, who constituted the control group. The subjects performing massage or studying in this field most often gained knowledge in the field of massage at post-secondary schools (Figure 1).

Taking the experience of the massage therapists into account, 5 groups were distinguished. The largest group consisted of 26 people with work experience in the range of 1-2 years,

11 people practiced massage for 3-4 years, 5 people for less than half a year, 2 people 6-7 years, 1 person had work experience in the range of 7-8 years. The percentage of massage therapists in individual subgroups is presented in Figure 2.

In the studied group, there was large variation in the masseurs' weekly working time. The subjects most often devoted 6-10 hours a week to massage (12 people) or less, up to 5 hours a week (9 people). Less numerous groups of subjects declared more frequent work with patients. 5 respondents marked one of the following ranges: 11-15 hours a week, 16-20 hours a week or 21-25 hours a week. 4 people chose 26-30 hours a week or 36-40 hours a week. In the group, there was also one massage therapist working 31-35 hours a week (Figure 3).

Persons qualified for the examination were subjected to a procedure aimed at determining the level of palpation, which was as follows:

1. Survey;
2. Hair test;
3. Assessment of STPD – Static Two-Point Discrimination;
4. Weight test.

Each time the examination consisted of the above-mentioned parts, without changing the order of the stage. The author of the work was responsible for taking measurements and supervising the course of tests. Participants started by completing the questionnaire. After answering the questions, they proceeded to the "hair test". This test consisted of locating a hair placed under the sheets of paper with only the use of one's hand. The examination began with 2 sheets of paper, and then after properly finding the hair, 1 sheet was added each time and the location of the searched object was changed. When the examined person provided the wrong answer or hesitated as to the location of the hair, the test was not passed. The recorded result was the largest number of pages for which the correct answer was given. The duration of the test was unlimited. For the test, white sheets of A4 paper were used; care was taken to ensure that there were no traces of folds, dents or other de-

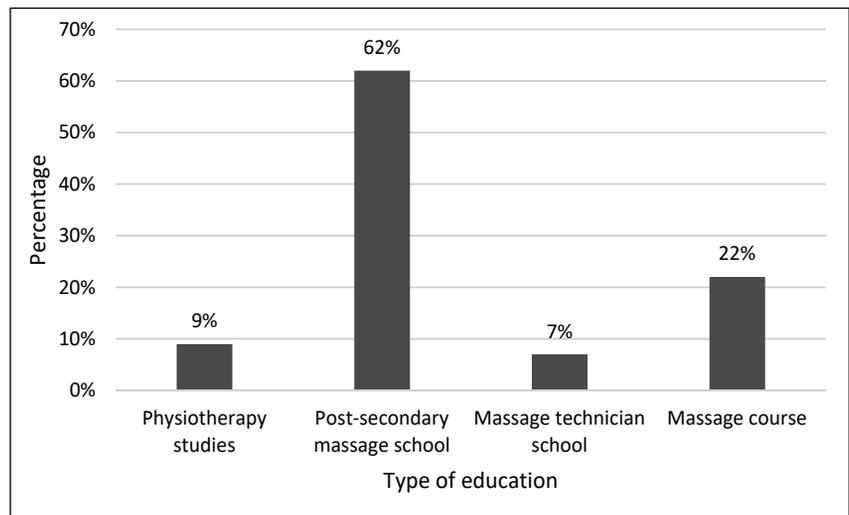


Figure 1
Percentage of respondents in the indicated forms of education

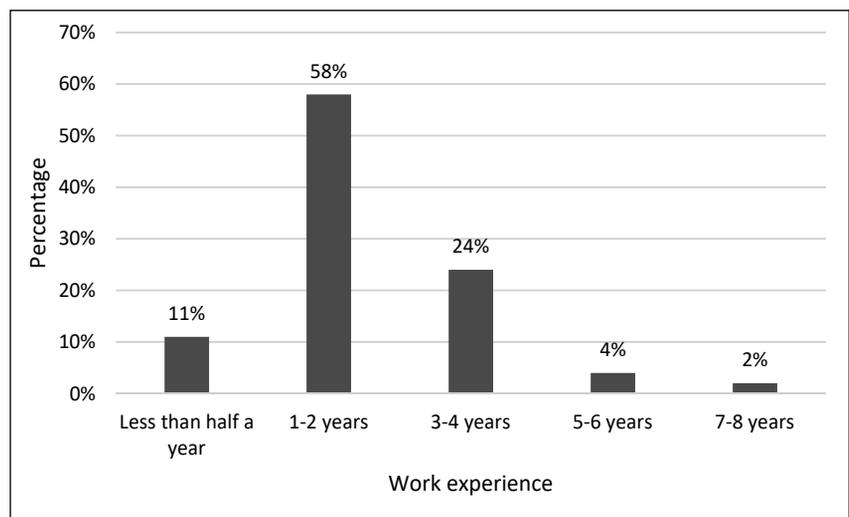


Figure 2
Percentage of massage therapists taking work experience into account

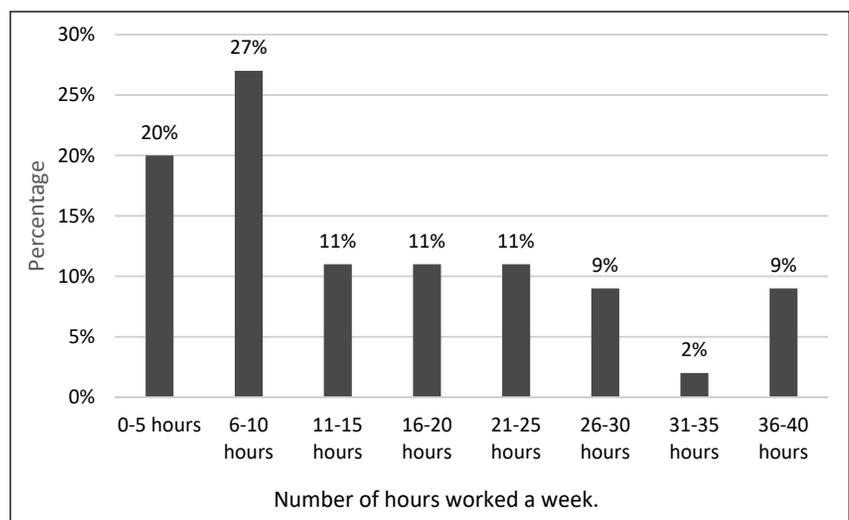


Figure 3
Percentage of massage therapists including work time per week

facts that could affect the test result. During the test, an identical, smooth surface was always provided. This function was fulfilled by a 350x250 mm glass pad. The same person's hair was used during each test.

STPD was performed at the next stage of the study. The Weber compass typically used in this type of test was replaced by a 160 millimeter Preisser analogue caliper. There was a line scale on the caliper guide, and a nonius on the slide allowing to read results with a ± 0.05 mm accuracy. The test was performed with the upper jaws of the caliper. STPD consisted of gently touching the skin with the caliper jaws set apart in such a way that the test subject clearly felt touch at two points. Particular attention was paid so as not to exert unnecessary pressure on the surface of the skin. Then, the caliper jaw spacing was gradually reduced until tactile discrimination occurred, i.e. the situation in which, despite touching the skin surface with the two ends of the caliper, the participant declared that s/he felt only one point. The result recorded was the last jaw spacing before discrimination occurred. During the STPD, the participant was seated with eyes closed. The tested upper limb was relaxed and supported on a stable surface, which was the table. The measurement was carried out in 5 points:

- in the middle of the thumb pad,
- in the middle of the tip of the index finger,
- in the middle of the middle finger pad,
- on the hypothenar of the little finger 1 cm distal to the hamulus of the hamate bone,
- on the thenar of the thumb in the middle of the first metacarpal bone.

Last was the “weight test”. A 150 x 220 mm Clatronic electronic scale with measurement accuracy up to 1 gram was used in the tests. Before the test, the participants were familiarised with the method of its performance. The tested person was asked to obtain a pressure of 500 g on the scale, maintain it for a few seconds and remember the force used. Then, the participant was asked to close his/

her eyes and copy the previously set value. When the participant decided that the force s/he was applying was equal to the previously set value, this was indicated and this result was recorded. Further, another measurement was carried out according to the above scheme, recommending obtaining 1,000 g. During the test, the scale was placed on a hard and stable surface. The test participant was seated with the upper limb supported while performing the test. During the whole procedure, efforts were made to ensure optimal external conditions that did not affect the results. The tests were carried out in a quiet, secluded room with a temperature of 20-21 °C.

STATISTICAL ANALYSIS

Statistical analysis was performed using the Statistica 12.0 programme. In order to define the characteristics of the studied group, descriptive statistics methods were used to determine central tendency measures such as arithmetic mean, median and dispersion measures such as maximum and minimum values, standard deviation and coefficient of variation. The degree of dependence between the examined features was calculated by determining Pearson's linear correlation coefficient and Spearman's correlation coefficient. The level of $p < 0.05$ was considered statistically significant. The significance of differences in average values between the two groups was verified using the Student's *t* test, and for more than two groups using ANOVA analysis of variance and analysis of variance with detailed comparisons using the Tukey's post hoc *t* test.

RESULTS

Descriptive statistics of the results obtained during the study were presented separately for the group of massage therapists and the control group in Tables 1 and 2. When interpreting the presented data, it should be noted that the largest possible number of pages in the “hair test” is desirable. In

the case of the “weight test”, the result is the better the closer to the baseline value, i.e. 500 g or 1,000 g, while in the case of the STPD, the lower the value, the better the test result.

The average results obtained by the massage therapists for each test were at a higher level than the results recorded for the control group. In the “hair test”, the massage therapists' results were better by an average of 33%. In the “weight test”, the group of massage therapists obtained results closer to the desired value. For the value of 500 g, these results were not so significant; the group of massage therapists gave the wrong results, on average, by 6 g (1.2%) and the control group, by 16 g (3.2%). However, this tendency intensified in the 1,000 g test, where the massage therapist were mistaken by an average of 36 g (3.6%) and those from the second group, by 158 g (15.8%). STPD measurements also showed significant differences between the groups under study. The average values of caliper jaw spacing in the control group were greater than the results obtained by the massage therapists in the case of the thumb by 37%, in the case of the index finger by 21%, in the case of the middle finger by 27%, in the case of the hypothenar of the thumb by 19% and in the case of the hypothenar of the little finger, 11%. These data showed a large range between the maximum and minimum results in each of the performed tests. This distribution of results indicates significant differences in the sensitivity of individual subjects, which means differentiation in the level of palpation skills of the subjects. The analysis showed that the factors shaping the level of these skills were age and experience. The group of massage therapists included both visually impaired and sighted individuals, as previous analyses showed that the level of visual impairment was a statistically insignificant factor. Correlation coefficients between the results of tests carried out and age as well as experience are presented in Table 3.

In the study group, a relationship between age and STPD results of the index and middle finger was noted.

This is a positive correlation, which means that the older the subject, the greater the caliper jaw spacing was subjected to discrimination. This result indicates deterioration of touch quality progressing with age in particularly sensitive areas and used by most specialists for palpation. In the case of experience, analysis showed that people with longer professional experience obtain better results

in the “hair test”. This means that a subject with longer work experience can locate hairs hidden under a larger number of pages. In the case of STPD, a relationship was observed between experience and sensation regarding the thumb and index finger. The discriminated distance of the caliper jaws in these areas was smaller in people with longer experience. In other areas and tests, no statistical-

ly significant influence on the results obtained by persons participating in the study was recorded.

DISCUSSION

The assessment of palpation skills and registration of information obtained during palpation is still difficult and ambiguous². Knowledge on this sub-

Table 1

Descriptive statistics for the tests performed in the group of massage therapists								
Variable	Descriptive statistics							
	Unit	N	Mean	Median	Min.	Max.	Standard deviation	Coefficient of variation
Hair test	n/sheets	45	4	4	1	10	1.6	35.2
Weight test (500 grams)	grams	45	506	508	260	794	105.2	20.8
Weight (1000 grams)	grams	45	1036	1024	730	1380	151.1	14.6
STPD – thumb	millimetres	45	2.7	2.6	1.4	5	0.7	25.3
STPD – index finger	millimetres	45	2.8	2.4	0.7	4.6	0.7	27.9
STPD – middle finger	millimetres	45	2.6	2.5	1	7	1	38.1
STPD – thenar	millimetres	45	5.3	4.8	2.2	12	2	38.4
STPD – hypothenar	millimetres	45	6.3	6.2	3.5	12.7	2	31.1

STPD – Static Two-Point Discrimination

Table 2

Descriptive statistics for the tests performed in the control group								
Variable	Descriptive statistics							
	Unit	N	Mean	Median	Min.	Max.	Standard deviation	Coefficient of variation
Hair test	n/sheets	13	3	3	2	5	0.7	25.7
Weight test (500 grams)	grams	13	486.2	480	151	715	150	30.8
Weight test (1000 gram)	grams	13	1158.2	1137	790	1700	254.3	21.9
STPD – thumb	millimetres	13	3.7	3.4	2.5	7	1.2	32.5
STPD – index finger	millimetres	13	3.4	3.3	2.2	8	1.4	42.2
STPD – middle finger	millimetres	13	3.3	2.9	1.9	10	2	61.4
STPD – thenar	millimetres	13	6.3	5.2	3.5	16	3.3	52.6
STPD – hypo thenar	millimetres	13	7	6.1	4.3	17	3.2	45.7

STPD – Static Two-Point Discrimination
*own source

Table 3

Correlation coefficients of test results with age and work experience								
Variable	Hair test	Weight test				STPD		
		500 grams	1000 grams	thumb	index finger	middle finger	thenar	hypothenar
Age	-0.08	-0.21	-0.20	0.16	0.34	0.45	0.04	0.01
Work experience	0.35	0.14	-0.25	-0.29	-0.37	-0.22	-0.1	-0.06

STPD – Static Two-Point Discrimination
The level of p <0.05 was considered statistically significant. Statistically significant data has been marked in bold.

ject seems to be disordered due to the complexity of the issue and methodological differences in published papers. This translates into the critical opinion of other professional groups regarding the usefulness of this type of research and manual work with the body.

Chaitow in 2003 and Muscolino in 2011 suggested that regularly performing the "hair test" for 2-4 minutes a day allows for a gradual increase in the number of pages under which hidden hair can be correctly located^{3,4}. This indicates the possibility of training touch and coincides with the results obtained in this study. This exercise seems to be useful for massage therapists, but it should be noted that this method is only a suggestion of the authors, which has not been so far supported by appropriate research⁵. Detailed studies could result in recognition of this method and its introduction as an exercise to improve palpation skills. The level of palpation skills was also attempted to be determined using STPD. Various standards can be found in the literature regarding this test. The American Society of Hand Surgery considers 6 mm as the norm^{6,7}.

Romanowaki and Lisiewicz-Bręborowicz⁸ also provide the same value. Contour considers 2 mm as the average value⁹. The measurement is usually made on the tip of the thumb, index finger and middle finger. The average value of results obtained in these areas in the study group was 2.8 mm. It should be noted that the authors use different types of equipment to perform the measurement. Weber's compass, the Disk-Criminator or callipers are considered the most professional devices. However, there are works in which, e.g. a paperclip is used¹⁰.

In 2002, Chandhok and Bagust conducted an experiment comparing STPD results in 74 students of 1st- and 5th-year chiropractic studies¹¹. The study showed that more advanced students have a lower threshold of sensory discrimination, which may indicate that better results of the subjects appeared as a result of training received during the course. These results coincide with the observations

made by the authors of this work. A disadvantage of the research conducted by Chandhok and Bagust was the failure to include a control group not related to manual therapy.

Foster and Bagust carried out further studies on palpability in 2004¹². STPD measurements and the modified "hair test" were performed in the experiment (the hair was replaced with a fishing line). The study included 1st-year chiropractic students as a control group, 5th-year students and experienced chiropractors. The results of statistical analysis showed a significant difference between the 1st- and 5th-year students in the STPD, however, there were no significant differences between the control group and the experienced chiropractors. In the case of the modified "hair test", there was a significant difference between the results of 1st-year students and the group of experienced chiropractors. These studies confirm the impact of training on the level of sensory discrimination. However, STPD measurements and "hair test" provide different results, similarly as in this work. Therefore, methods for assessing palpability should be refined.

The positive impact of training on the level of two-point discrimination is also confirmed in the research conducted by Dane et al.¹³ in 2017. The study comprised 104 students from each of the 4 chiropractic training age-groups. After analysing the results, a reduction of the discrimination threshold was demonstrated in students at a more advanced stage of education. Pressure control is another important element of palpation.

In 1993, Keating tried to test this ability with a bathroom scale. On a group of 12 physical therapists, he demonstrated that they are able to more accurately map the expected pressure, which coincides with the results obtained in this work¹⁴. In the group studied by Keating, physical therapists reduced the size of mistakes after the training cycle. This is not reflected in the results obtained by massage therapists for whom greater experience did not mean better results. However, there were some methodological differ-

ences between the studies. The Keating test used a bathroom scale, and the set values were 1, 5, 10, 15 and 20 kilograms. In the second case, an electronic scale was used and the set values were 500 g and 1,000 g. The use of the "weight test" as a form of training should be carefully considered. Attention should also be paid to the fact that awareness of the applied pressure is only one of the modalities of sensation, and the method itself requires further confirmation.

Lee et al. also attempted to determine the impact of experience on palpation in 1998 using a silicone breast gland phantom. Pre-medical students and 1st-, 2nd- and 3rd-year students of medicine participated in the study. The impact of practice on mammary gland examination skills was assessed. The research did not show any significant differences between individual year-groups of medical students. However, a difference was observed between pre-medical students who did not know this test and medical students who were already taught it. Therefore, it cannot be clearly stated whether the lack of exercises or the lower level of knowledge in the control group had a decisive influence on the results.

Another study using the silicone model of the mammary gland was carried out by Domżała in 2015¹⁶. Manual therapists and office workers were subjected to the experiment. The author noted statistically significant differences between office workers and therapists with at least 3 years of work experience. Of course, it is difficult to compare the results of the above tests with the results obtained by the author of this work due to differences in the used equipment. However, in both cases, a similar tendency is visible, i.e. this work confirms that experience shapes the level of palpatory skills, and touch precision is a modifiable feature. Analysis of the test material indicates that palpation abilities change throughout life under the influence of various types of factors. Accurate determination of all factors and their significance using simple tools is difficult, which provides an incomplete image of the studied issue. This is due

to the large number of modalities felt by a human, which in turn, translates into the involvement of numerous structures in this process. In addition, the impressions received by individual people are always slightly different and it is difficult to find the right key to standardise this information and subject it to objective assessment.

Due to the difficulties described above, it should be borne in mind that this work was only an attempt to characterise the factors shaping palpation and includes only selected components of the sense of feeling. However, making this type of attempt allows expanding the existing state of knowledge and can become a contribution and an incentive to continue research.

CONCLUSIONS

Analysis of the obtained results allows the following conclusions to be drawn:

1. Age adversely affects the level of palpation skills in visually impaired and sighted massage therapists.
2. The experience of those included in the study has a positive ef-

fect on the level of their palpation skills.

3. The level of palpation skills, and thus, the accuracy of palpation in visually impaired and sighted massage therapists, changes over the course of their lives and can be somewhat modified, e.g. by length of professional experience or appropriate training.

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