

Validity and Reliability of Asbestos Knowledge and Awareness Questionnaire for Environmental Asbestos Exposure in Rural Areas

Selma Metintaş¹, Güntülü Ak², Şenay Yılmaz², Filiz Boğar³, Muzaffer Metintaş²

¹Department of Public Health, Lung and Pleural Cancers Research and Clinical Center, Eskişehir Osmangazi University School of Medicine, Eskişehir, Turkey

²Department of Chest Diseases, Lung and Pleural Cancers Research and Clinical Center, Eskişehir Osmangazi University School of Medicine, Eskişehir, Turkey

³Lung and Pleural Cancers Research and Clinical Center Eskişehir Osmangazi University, Eskişehir, Turkey

Abstract

Objective: There is no treatment for asbestos-related diseases, but they can be prevented. One of the first interventions is to improve the knowledge level of people in order to protect people from asbestos and asbestos-related diseases. The present study was conducted to develop a questionnaire for measuring the knowledge and awareness level of asbestos and also assess its validity and reliability in a rural population that is exposed to asbestos environmentally.

Methods: A questionnaire, interviewer-administered, that included 37 items was employed on a convenient sample consisting of adult persons who attended a tertiary teaching hospital in Eskişehir where asbestos exposure is widespread in its rural areas. After assessment of validity and reliability of the results, the questionnaire was refined to 19 items and one subscale.

Results: A total of 760 participants were included in this study. The mean age of participants was 53.2±15.1 years and 51.6% of them were male. The discrimination and difficulty indices of the asbestos knowledge and awareness questionnaire ranged between 20.0–60.5% and 0.39–0.98, respectively. Cronbach's alpha coefficient was 0.951 for overall items. The median (min–max) and mean (SD) score of the study population were 30 (19–56) and 33.9 (11.9), respectively. The score increased correspondingly with greater knowledge levels.

Conclusion: This questionnaire is a practical and easy tool to apply with acceptable reliability and validity on high-risk adults in rural areas with environmental asbestos exposure.

Keywords: Asbestos, environmental exposure, questionnaire, reliability, validity



Received Date: 10.08.2016

Accepted Date: 25.10.2016

DOI: 10.5152/ejp.2016.57441

Corresponding Author

Güntülü Ak

E-mail: guntuluak@gmail.com

• Available online at www.eurasianj pulmonol.com



This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

INTRODUCTION

Inhalation of asbestos fibers is known to cause benign/malignant pleural and lung diseases such as malignant mesothelioma, lung cancer, diffuse pleural thickening, pleural plaque, and asbestosis (1–4). Though there is no treatment for the asbestos-related diseases, they can be prevented by preventing asbestos exposure. Therefore, occupational exposure to asbestos can be controlled by prohibition of asbestos usage in the occupational setting in most countries. However, it is not easy to control environmental asbestos exposure in rural areas. Asbestos exposure in rural areas is a common in many parts of the world including Turkey, Greece, Cyprus, Corsica, and New Caledonia (1–8). Villagers living in places with abundant asbestos-contaminated soil learned that this soil, called “white soil” in Turkey, “pö” in New Caledonia, and “luto” in Greece (1, 7, 8), have some advantageous properties. They have used this kind of soil for whitewashing–plastering, roofing, and flooring in their houses. While the instant exposure level in a rural area is generally much lower than in occupational settings, the risk of mesothelioma and other asbestos related diseases in these regions is as high as in occupational cohorts (1–4, 7, 8). It might be reasoned that the exposure starts at birth and continues throughout life in these regions.

The Turkish Mesothelioma Working Group has determined that there is still asbestos exposure in 379 villages in Turkey. The combined population of these 379 villages was estimated to be 158,068 based on data from the Turkish Statistical Institute (9). Previous studies have already demonstrated that benign/malignant pleural and lung diseases such as mesothelioma, lung cancer, diffuse pleural thickening, pleural plaque, and asbestosis due to asbestos are common in Eskişehir where intensive asbestos exposure in its rural area exists (1–4).

According to Knowledge–Attitude–Behavior model, knowledge can be thought of as a mandatory requirement to implement a health-related behavior. Improving knowledge leads to improve attitudes, and improving attitudes leads to behavioral changes (10). One of the starting interventions is to improve the knowledge level of people in order to protect them from asbestos and asbestos-related diseases. Asbestos awareness should be increased in society. People should know that asbestos is a kind of mineral fiber that enters the body by inhalation and causes severe respiratory diseases such as mesothelioma and asbestosis. In addition, people should avoid asbestos. This situation suggested that if knowledge of asbestos exposure becomes clearer and understandable in society, the number of asbestos-related diseases would decrease. In the literature, studies about clarifying the knowledge of environmental exposure to asbestos have indicated that surveys and measurement tools are not suitable for understanding the situation in current societies.

Some of the questionnaires about usage of asbestos in the occupational setting were developed and used by several institutions (11–13). However, there is no questionnaire evaluating non-occupational asbestos exposure, which has become a subject of research in recent years, and environmental asbestos exposure continues in rural areas of developing countries. Therefore, the present study was conducted on the development of a questionnaire for measuring the knowledge and awareness level of asbestos and also assesses its validity and reliability.

METHODS

Establish the Face and Content Validity of the Asbestos Knowledge and Awareness Questionnaire (AKAQ)

Initially, we examined recent literature and educational materials from Eskişehir Osmangazi University, Lung and Pleural Cancers Research and Clinical Center, and International Agency for Research on Cancer about asbestos and its effect on human health (14, 15). We performed a comprehensive literature review and discovered many items that measured asbestos knowledge and awareness levels. We chose 37 items for the questionnaire according to the recommendations of specialists. Items consisted of complete sentences of correct or incorrect statements. We asked participants to answer 'right', 'wrong', or 'do not know' for each item. Eight of the items were incorrect statements.

Seven experts (one epidemiology specialist, three chest physicians, a doctorate (Ph. D.) student, and two cancer nurses) were asked to review the items in the questionnaire to determine the construct validity. They were asked to assess the items in three groups: "essential", "useful but inadequate", or "unnecessary". The content validity ratio and content validity index of items in the questionnaire were 0.71 and 0.77, respectively. The specialists found 3 items (I know what asbestos is; Asbestos is related to AIDS; Asbestos is related to hepatitis) as

unnecessary and these items were excluded from the questionnaire according to content validity criterion. A Turkish language specialist evaluated the completed questionnaire and the necessary changes were made. A pilot study of the questionnaire was performed on 10 participants who were asked to insert written comments and provide verbal feedback. All of the participants reported that the numbered items were clear. Cronbach's alpha coefficient was 0.951 for the pilot study.

Study Group and Procedure

All participants gave informed consent. The study was performed in Eskişehir, a province located in central Turkey with a population of 837,050 (16). There are two Universities in the city and one medical facility. The study was carried out in Eskişehir Osmangazi University Hospital, the biggest hospital with a 1100-bed capacity, in the city.

The sample size was calculated as 740 people based on the statement "sample size should be 10 to 20 times the number of items in the study questionnaire" (17). The study population consisted of patients and their relatives who were admitted to Eskişehir Osmangazi University Hospital. Asbestos exposure is widespread in the surrounding rural areas. The study was performed on willing participants older than eighteen that had normal cognitive levels (sufficient to answer the questions).

Ethics Approval

The study was reviewed and approved by the Eskişehir Osmangazi University Ethical Committee (Approval number 2016 - 3).

Evaluation

Participants completed the questionnaire on socio-demographic characteristics including age, sex, educational status, occupation, settlement area, and birthplace. The questions about birthplace and settlement area of the participants were coded as urban, semi-rural, and rural area. An urban area was defined to have a population more than 5000; semi-rural area was defined to have a population between 3000 to 5000; and rural area was defined to have a population less than 3000. The questionnaire also included whether the participants had asbestos exposure. Two participants were excluded from the study because of occupational asbestos exposure. Questionnaire administration required between 10 and 15 minutes. The study population was classified into 4 groups according to their asbestos exposure in the birthplace and settlement area. Group 1 consisted of participants who were living in the city and had no asbestos exposure; Group 2 were living in the city and had asbestos exposure in a part of their life; group 3 were living in a rural area and had no asbestos exposure; group 4 were living in a rural area and had asbestos exposure in a part of their life.

Reliability Analysis

Discrimination and Difficulty Indices

Difficulty and discrimination indices were calculated for each item. The difficulty index confirms that an appropriate range of results, which are neither too easy nor too difficult, is assessed for the population under study. Knowledge questions should be not too easy or too difficult, and an appropriate range falls between 20% to 80% correct responses. This index is calculated using the formula $P = (H+L/N) \times 100\%$, where P is the item difficulty index. H is the number of participants answering the item correctly in the high achieving

group. L is the number of participants answering the item correctly in the low achieving group, and N is the total number of participants in these two groups. Other reliability tests include measures of robustness, such that tests can differentiate based on a range of ability, e.g., high or low knowledge. This factor was measured quantitatively using an item discrimination index, which measures the ability of the item to discriminate between participants who do well on the test and participants who do not. The discrimination index was calculated using the formula $d=(H-L/N) \times 2$. The suggested criterion for inclusion is that items should correlate with the total score beyond a value of 0.20 (18). Fifteen items were excluded from the questionnaire based on the difficulty and discrimination indices. The upper limit was 80% for the study difficulty index. Items that were too easy, too hard, or exhibited low selectivity were excluded. In order to determine floor and ceiling effects, we compared the 10% of participants with the highest score and the 10% of participants with the lowest scores.

Factor Analysis

Exploratory factor analysis was calculated using a principal factor method with varimax rotation to evaluate the scale's construct validity. Factor analysis adequacy was assessed by the Kaiser–Meyer–Olkin (KMO) test scale. The KMO result was >0.50 , and factor analysis was performed. All the items exhibited factor loadings of >0.20 in the analysis; there was no need to remove any of the items from the questionnaire (19). According to factor loadings obtained from the factor analysis, items pertained to a sub-dimension according to their maximum factor weight. One sub-dimension was identified by the factor analysis.

Internal Consistency

Cronbach's alpha coefficient and item total correlation were calculated for the reliability analyses of each subscale. Items greater than 0.20 of total item correlations were considered reliable. None of the items were less than 0.20 and no items were excluded from the questionnaire (20).

Scoring

The final scale had 19 items with one sub-dimension (Appendix 1). The expression was incorrect for 5 items. Each correct answer was worth 3 points. Incorrect statements were encoded inversely to the other items. The maximum score was 57 and the minimum score was 19 for the entire scale.

Statistical Analysis

Data were analyzed using Statistical Package for the Social Sciences version 20.0 for Windows (Armonk, NY: IBM Corp.). The demographic characteristics of the study group were reported using descriptive statistics (frequencies, proportions, means, and medians). Initially, the normality of the total scores was tested using the Kolmogorov–Smirnov normality test and graphs. Therefore, the median scores were compared using the Kruskal Wallis (and Bonferroni's ad hoc test) and Mann–Whitney U tests.

RESULTS

A total of 760 participants were included in this study. The mean age was 53.2 ± 15.1 years old (18–89) and 51.6% of the participants were male. About 48.2% of the participants were born in a rural area and 14.1% of them still live in a rural area. The educational statuses were 8.0% illiterate; 57.1% elementary school; 18.6% secondary school, and 16.3% university.

Table 1. Reliability analyses and factor loading of the items

Items	Percentage of correct answer	Factor loading	Corrected item total correlation	If item deleted Cronbach's alpha
White soil is used for plastering/ whitewashing	67.8	0.264	0.247	0.955
White soil includes asbestos	17.5	0.597	0.417	0.952
White soil is harmful	51.2	0.854	0.500	0.951
White soil is related to asbestos	22.2	0.433	0.566	0.950
White soil is a solid material	34.6	0.733	0.701	0.948
Asbestos is used various areas	46.6	0.663	0.626	0.949
Asbestos is harmful to human health	25.7	0.528	0.829	0.946
Asbestos enters the body by inhalation	40.3	0.783	0.745	0.947
Asbestos is used as a plastering/ whitewashing material	32.4	0.774	0.748	0.947
Asbestos is used as a roofing material	13.2	0.550	0.517	0.950
Asbestos is used for shipbuilding	13.9	0.516	0.481	0.951
Asbestos is used as a construction material	15.1	0.518	0.483	0.951
Asbestos is related to bladder cancer	39.5	0.936	0.905	0.944
Asbestos is related to melanoma	33.0	0.908	0.873	0.945
Asbestos is related to lung cancer	39.9	0.939	0.911	0.944
Asbestos is related to diffuse pleural thickening	19.2	0.898	0.867	0.945
Asbestos is related to malignant mesothelioma	23.3	0.936	0.876	0.945
Asbestos is related to colon cancer	37.5	0.924	0.892	0.944
One is required to avoid asbestos	47.6	0.874	0.844	0.945

Table 2. The overall Cronbach's alpha values of AKAQ for the study population grouped by socio-demographic properties

Variables	Cronbach's alpha value
Age groups	
29	0.961
30-39	0.957
40-49	0.951
50-59	0.945
60-69	0.948
>70	0.949
Sex	
Female	0.950
Male	0.952
Settlement area	
Urban	0.950
Semi-rural	0.951
Rural	0.939
Total	0.951

A total of 402 (52.9%) participants had asbestos exposure; 237 (31.2%) participants stated that they knew about asbestos. However, 520 (68.8%) of the participants did not know about asbestos.

Discrimination and Difficulty Indices

The difficulty index of the AKAQ was 9.02% (easy items), and a low discrimination index was 0.17. Finally, low difficulty indices were found for some of the statements related to environmental usage of asbestos in rural areas such as molasses soil, roofing material, and floor tiling. Low difficulty indices were also found for some of the settings that used asbestos such as cleaning material production (false), aircraft construction, glass production (false), automotive construction, pipe insulation, welding, gold/silver production, medicine production (false), floor tiles, heat and water resistant cloth production, coal boiler production, electrical wiring insulation. These items were excluded from the questionnaire.

The discrimination of the AKAQ ranged between 20.0-60.5% and the median value was 37.6%. The difficulty indices of the AKAQ ranged between 0.39-0.98 and the median value was 0.67. Reliability analyses and factor loading of the items are summarized in Table 1. The median scores of the lowest and highest scoring 10% of participants were 22 (19-24) and 49 (35-56), respectively ($p < 0.001$).

Factor Analysis

The construct validity of the AKAQ was assessed using factor analysis. The KMO measure of sampling adequacy was 0.955. Bartlett's test of sphericity was significant ($X^2=15383.417$, $df=210$; $p < 0.001$). A Scree plot and eigenvalues determined that one factor should be retained, which accounted for 55.5% of the variance. The questionnaire factor loadings varied between 0.264 and 0.939.

Table 3. Demographics and the AKAQ score of the study population

Variables	n (%)	AKAQ Score Median (Min-Max)	Statistical Value z/ KW; p
Age group			
>29	63 (8.3)	30.0 (20-55)	p=0.053
30-39	76 (10.0)	34.5 (19-56)	
40-49	152 (20.0)	32.5 (19-56)	
50-59	185 (24.3)	38.0 (19-56)	
60-69	174 (22.9)	26.5 (19-54)	
>70	110 (14.5)	24.5 (19-53)	
Sex			
Male	392 (51.6)	31 (19-56)	p=0.350
Female	368 (48.4)	27 (19-55)	
Settlement area			
Urban	538 (70.8)	36.0 (19-56)	p<0.001
Semi-rural	115 (15.1)	24.0 (20-52)	
Rural	107 (14.1)	24.0 (20-52)	
Education			
Illiterate	61 (8.0)	24 (21-52)	p<0.001
Primary school	434 (57.1)	25 (19-54)	
High school	141 (18.6)	39 (20-56)	
University	124 (16.3)	46 (20-56)	

AKAQ: Asbestos Knowledge and Awareness Questionnaire; KW: Kruskal Wallis

Internal Consistency

Internal consistency was assessed by Cronbach's alpha, and the value was 0.951 for overall items. The deletion of any item from the questionnaire produced Cronbach's alpha values that ranged between 0.944-0.955. Corrected item total correlation coefficient ranged between 0.247-0.911 for the questionnaire (Table 2).

Cronbach's alpha value did not change according to socio-demographic characteristics of the study populations.

Hypothesis for Validity

The hypothesis was established that participants would get a higher score if they knew about asbestos. Two hundred and thirty-seven participants knew about asbestos and their median score was 47 (min-max: 23-56). However, 502 of the participants did not know about asbestos and their median score was 24 (19-49) ($p < 0.001$).

Determination of Score Values

The median (min-max) and mean (SD) score of the study population were 30 (19-56) and 33.9 (11.9), respectively (Table 3).

The median scores were not different among age groups and between male and female participants ($p=0.053$ and $p=0.350$, respectively). Participants living in an urban area had higher median scores than the participants living in semi-rural and rural areas. The median score was higher in the educated participants who went to high school and university ($p<0.001$).

DISCUSSION

This study developed a tool to measure asbestos knowledge levels in an efficient and correct manner. It is important to evaluate the test items to determine its efficacy by assessing peoples' knowledge based on the difficulty and discrimination indices of the test items. Difficulty and discrimination indices of the AKAQ varied between 20.0–60.5% and 0.39–0.98, respectively. Brown and Crocker reported that a discrimination index of 0.2 or higher is acceptable, and the test items should differentiate between weak and knowledgeable people (21). Fifteen items, which included asbestos usage, were excluded from the questionnaire because of the unsuitability of difficulty and discrimination indices. The rest of the items were suitable for difficulty and could individuate the knowledge level of asbestos. Turkey is a country where the general population has not yet received any training to aware asbestos. Therefore, the results reflect this situation.

Construct validity refers to a questionnaire's ability to measure the target concept and/or conceptual structure. Factor analysis is a commonly used method for evaluating construct validity (22). In this study, the KMO test value was found to be 0.955. The KMO test result indicated that the AKAQ is reliable, and the Bartlett test result was found to be statistically significant, which means that the structure of the AKAQ is suitable for factor analysis (23).

Factor loadings of 0.10 are accepted as low, 0.30 as moderate, and values of 0.59 or above are considered high. A high factor loading shows that the item is a valid indicator of the related factor (23). In the current study, it was observed that the factor loading was 0.264 for one item and 0.433 for another item. The factor loadings were between 0.516–0.939 for the rest of the items. As a result, the scale could not be separated into components and had a single dimension. These results showed that construct validity of the questionnaire was sufficient. There has been no questionnaire study on this issue. Therefore, we could not compare the results of our study to others.

Cronbach's alpha coefficient, which represents internal consistency reliability, should be higher than 0.70 (19). Cronbach's alpha coefficients for the AKAQ were 0.951 for the entire questionnaire and greater than 0.944 for if item deleted Cronbach's alpha (Table 1), which implies that the questionnaire exhibited considerable reliability. This result indicates that the items in the questionnaire are consistent with each other and that the questionnaire contains items that measure the same characteristic.

The participants were homogeneous and did not show statistically significant differences in the means of their ages or sex. The results suggested that the AKAQ was reliable and a valid measurement tool for adults at-risk to environmental asbestos exposure. The median score was higher in the participants who lived in urban areas and the educated participants who went to high school and university. It was expected that the score of a questionnaire that measured knowledge level would be higher in participants who lived in urban areas and were more educated.

Strengths and Limitations of the Study

Although there is sufficient evidence about its human carcinogenic effects, evidence shows that controlling the usage of asbestos is almost impossible in a population with very low levels of asbestos awareness. For this reason, to develop a knowledge level questionnaire is important. To our knowledge, this is the first study in Turkey (and worldwide) in which a questionnaire was developed for rural populations and its reliability and validity were shown. Participants were recruited via non-probability sampling, and included patients and their relatives admitted to the tertiary teaching hospital. The questionnaire should be applied to measure environmental usage of asbestos in the rural area, but it should be supported by other studies and improved.

CONCLUSION

The study aimed to develop the AKAQ, evaluate the construct validity, internal consistency, reliability, and finally test the questionnaire. The AKAQ was found to be a valid and reliable instrument that was suitable for measuring the knowledge of a population about asbestos. We thought that this questionnaire could provide useful information and guidance for prevention activities, after proper consistency even in countries where had similar asbestos exposure in their rural area. Therefore, we recommend that this AKAQ be supported by other studies, applying it to a larger population in their region of study.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Eskişehir Osmangazi University.

Informed Consent: Verbal informed consent was obtained from participants who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - S.M.; Design - S.M., G.A.; Supervision - M.M.; Materials - G.A., Ş.Y., M.M.; Data Collection and/or Processing - G.A., Ş.Y., F.B.; Analysis and/or Interpretation - S.M.; Literature Search - G.A., S.M.; Writing Manuscript - S.M.; Critical Review - S.M., G.A., M.M.

Acknowledgements: We thank all our patients and their relatives. Data were analyzed and evaluated in Eskişehir Osmangazi University Lung and Pleural Cancers Research and Clinical Center.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study has received no financial support.

REFERENCES

1. Metintas S, Metintas M, Ucgun I, Oner U. Malignant mesothelioma due to environmental exposure to asbestos: follow-up of a Turkish cohort living in a rural area. *Chest* 2002; 12: 2224-9. [CrossRef]
2. Metintas S, Metintas M, Ak G, Kalyoncu C. Environmental asbestos exposure in rural Turkey and risk of lung cancer. *Int J Environ Health Res* 2012; 22: 468-79. [CrossRef]
3. Senyigit A, Babayigit C, Gokirmak M, Topcu F, Asan E, Coskunsel M, et al. Incidence of malignant pleural mesothelioma due to environmental asbestos fiber exposure in the southeast of Turkey. *Respiration* 2000; 67: 610-4. [CrossRef]
4. Metintas M, Metintas S, Hillerdal G, Ucgun I, Erginel S, Alatas F, et al. Non-malignant pleural lesions due to environmental exposure to asbestos: a field-based, cross-sectional study. *Eur Respir J* 2005; 26: 875-80. [CrossRef]
5. Constantopoulos SH. Environmental mesothelioma associated with tremolite asbestos: lessons from the experiences of Turkey, Greece, Corsica, New Caledonia and Cyprus. *Regul Toxicol Pharmacol* 2008; 52: S110-5. [CrossRef]

6. Hillerdal G. Mesothelioma: cases associated with non-occupational and low dose exposures. *Occup Environ Med* 1999; 56: 505-13. [\[CrossRef\]](#)
7. Baumann F, Rougier Y, Ambrosi JP, Robineau BP. Pleural mesothelioma in New Caledonia: An acute environmental concern. *Cancer Detect Prev* 2007; 31: 70-6. [\[CrossRef\]](#)
8. Sakellariou K, Malamou-Mitsi V, Haritou A, Koumpaniou C, Stachouli C, Dimoliatis ID, et al. Malignant pleural mesothelioma from nonoccupational asbestos exposure in Metsovo (north-west Greece): slow end of an epidemic? *Eur Respir J* 1996; 9: 1206-10. [\[CrossRef\]](#)
9. Metintas M. Turkey asbestos control strategic plan final report. *Turk Thorac J* 2015; 16: S1-26.
10. Whitehead D. A stage planning programme model for health education/health promotion practice. *J Adv Nurs* 2001; 36: 311-20. [\[CrossRef\]](#)
11. Tiwari RR, Saha A. Knowledge and attitude towards asbestos hazards among asbestos workers in India. *Int J Occup Environ Med* 2015; 6: 58-60.
12. Asbestos Awareness Quiz. (Accessed 09 April 2016). Available from: <https://ehs.okstate.edu/modules/asbestos/asbtest.htm>.
13. Survey for asbestos experts. (Accessed 09 April 2016). Available from: http://www.adam-europe.eu/prj/10950/prd/4/2/D1.1_Survey_Expert_EN.pdf.
14. Metintas M. Mesothelioma and asbestos and erionite exposure in Turkey. 1st ed. Ankara: Rota Tıp; 2014.
15. World Health Organization. Chrysotile asbestos. (Accessed 09 April 2016). Available from: http://www.who.int/ipcs/assessment/public_health/chrysotile_asbestos_summary.pdf.
16. Eskişehir population 2016. (Accessed 09 April 2016). Available from: <http://www.nufusu.com/il/eskisehir-nufusu>.
17. Erefe I. *Nursing Research Principles, Process and Methods*. 4th ed. Ankara: Odak Ofset; 2004.
18. Kline P. *An Easy Guide to Factor Analysis*. 1st ed. London and New York: Routledge, Taylor & Francis Group; 1994.
19. Cam MO, Baysan Arabaci L. Qualitative and quantitative steps on attitude scale construction. *Turk J Res Dev Nurs* 2010; 2: 59-71.
20. Polit DF, Beck CT. The content validity index: are you sure you know what's being reported? Critique and recommendations. *Res Nurs Health* 2006; 29: 489-97. [\[CrossRef\]](#)
21. McCowan RJ, McCowan S C. Item analysis for criterion-referenced tests. Research Foundation of SUNY / Center for Development of Human Services 1999. (Accessed 09 April 2016). Available from: <http://files.eric.ed.gov/fulltext/ED501716.pdf>.
22. Gözüm S, Aksayan S. A guide for trans-cultural scale adaptation II. Psychometric characteristics and cross-cultural comparisons. *Turk J Nurs Res* 2003; 5: 3-14.
23. Gunay EY, Gul A. Reliability and validity of the Cambridge Worry Scale in pregnant Turkish women. *Midwifery* 2015; 31: 359-64. [\[CrossRef\]](#)

Appendix 1.**Asbestos Knowledge and Awareness Questionnaire**

1- White soil is used for plastering/ whitewashing.

True False Don't know

2- White soil includes asbestos.

True False Don't know

3- White soil is harmful.

True False Don't know

4- White soil is related to asbestos.

True False Don't know

5- White soil is a solid material.

True False Don't know

6- Asbestos is used various areas.

True False Don't know

7- Asbestos is harmful to human health.

True False Don't know

8- Asbestos enters the body by inhalation.

True False Don't know

9- Asbestos is used as a plastering/whitewashing material.

True False Don't know

10- Asbestos is used as a roofing material.

True False Don't know

11- Asbestos is used for shipbuilding.

True False Don't know

12- Asbestos is used as a construction material.

True False Don't know

13- Asbestos is related to bladder cancer.

True False Don't know

14- Asbestos is related to melanoma.

True False Don't know

15- Asbestos is related to lung cancer.

True False Don't know

16- Asbestos is related to diffuse pleural thickening.

True False Don't know

17- Asbestos is related to malignant mesothelioma.

True False Don't know

18- Asbestos is related to colon cancer.

True False Don't know

19- One is required to avoid asbestos.

True False Don't know

Thank you for your participation.